



Revision of 9B Regulations Governing Non-Federal Oil and Gas Activities



Draft Environmental Impact Statement

2015

UNITED STATES DEPARTMENT OF THE INTERIOR – NATIONAL PARK SERVICE
DRAFT REVISION OF 9B REGULATIONS GOVERNING NON-FEDERAL OIL AND GAS ACTIVITIES
ENVIRONMENTAL IMPACT STATEMENT

Nationwide

Lead Agency: National Park Service (NPS), U.S. Department of the Interior

This draft *Rule Revision / Environmental Impact Statement* (EIS) was prepared for all units of the national park system with non-federal oil and gas production occurring, or likely to occur in the foreseeable future, within and adjacent to their legislative boundaries. The NPS has comprehensive regulations governing non-federal oil and gas development. These regulations are contained within Title 36 of the Code of Federal Regulations (CFR), Part 9, Subpart B, and are referred to as the “9B regulations.” Over the last 36 years, implementation of the existing 9B regulations to proposed operations has allowed the NPS and non-federal oil and gas operators to protect park resources and human health and safety while recognizing the exercise of non-federal oil and gas rights in parks.

The current regulations have been in effect for over 36 years and have not been substantively updated during that period. During the years of implementing the 9B regulations, the NPS has become increasingly aware of several issues that would require specific changes to the regulations in order to improve understanding, efficiency, enforcement, and resource protection in parks. In addition, the oil and gas exploration and development industry has made significant advances in technology and practices over the last 36 years since the 9B regulations were initially promulgated, and the proposed revisions are designed to reflect such advances, particularly with respect to protection of park natural and cultural resources, and human health and safety.

This EIS describes three alternatives (including a no-action alternative) for regulatory provisions governing the management of non-federal oil and gas operations. It describes the environment that would be affected by the alternatives and evaluates the impacts of three alternatives: continuation of the current regulations (the no-action alternative); and two action alternatives for revisions to the existing regulations governing non-federal oil and gas management in these units. The EIS analyzes impacts of these alternatives in detail for geology and soils; air quality; water resources; wetlands; floodplains; vegetation; wildlife and aquatic species, including state and federally listed threatened and endangered species and species of special management concern; visitor use and experience; scenic views and night sky resources; natural sounds; cultural resources; park management and operations; and socioeconomics. Upon conclusion of the EIS and decision-making process, one of the alternatives would represent the regulatory provisions which would guide future non-federal oil and gas management at units of the national park system. Alternative B is the environmentally preferable alternative and the NPS preferred alternative.

The review period for this document will end 60 days after publication of the U.S. Environmental Protection Agency Notice of Availability in the Federal Register. Comments will be accepted during the 60-day comment period electronically through the NPS Planning, Environment, and Public Comment website listed below or in hard copy delivered by the U.S. Postal Service or other mail delivery service or hand-delivered to the address below. Comments will not be accepted by fax, email, or in any other way than those specified above. Bulk comments in any format (hard copy or electronic) submitted on behalf of others will not be accepted. Before including your address, telephone number, electronic mail address, or other personal identifying information in your comments, you should be aware that your entire comment (including your personal identifying information) may be made publically available at any time. While you can ask us in your comments to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. After public review, the document will be revised in response to public comments. A final version of the document will then be released, and a 30-day no-action period will follow. Following this 30-day period, the alternative or actions constituting the approved rule revision will be documented in a record of decision that will be signed by the Director of the NPS, or his or her designee.

For further information, visit <http://parkplanning.nps.gov/DEIS9B> or contact:

Michael B. Edwards / Environmental Quality Division
National Park Service
michael_b_edwards@nps.gov
303-969-2694



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EXECUTIVE SUMMARY

This draft *Rule Revision / Environmental Impact Statement* (EIS) presents three alternatives for managing non-federal oil and gas operations: the no-action alternative, and two action alternatives involving revisions to the existing regulatory provisions contained within Title 36 of the Code of Federal Regulations (CFR), Part 9, Subpart B (“9B regulations”). It assesses the impacts that could result from continuing under the current regulations (the no-action alternative) or implementation of either of the action alternatives.

At the conclusion of this decision-making process, the alternative selected for implementation will guide the National Park Service (NPS) in the management of non-federal oil and gas operations.

BACKGROUND

The NPS ensures that non-federal oil and gas development in parks complies with these legal and policy requirements through application of the 9B regulations. The 9B regulations govern all activities that are associated with the exploration and development of non-federal oil and gas rights located within park boundaries where access is on, across, or through federally owned or controlled lands or waters. Under authority granted by Congress, the 9B regulations were promulgated in 1978 with an effective date of January 8, 1979. These regulations were promulgated to ensure that all non-federal oil and gas operations in parks are conducted in a manner consistent with the purposes for which the national park system and each affected park unit was created.

Over the last 36 years, implementation of the existing 9B regulations to proposed operations has allowed the NPS and non-federal oil and gas operators to protect park resources and human health and safety while recognizing the exercise of non-federal oil and gas rights in parks. However, during the years of implementing the 9B regulations, the NPS has become increasingly aware of several issues that would require specific changes to the regulations in order to improve understanding, efficiency, enforcement, and resource protection in parks. In addition, the oil and gas exploration and development industry has made significant advances in technology and practices over the last 36 years since the 36 CFR 9B regulations were initially promulgated (these include three-dimensional geophysical exploration, extended-reach directional and horizontal drilling capability, and use of containerized drilling fluid systems), and the proposed revisions are designed to reflect such advances, particularly with respect to protection of park natural and cultural resources, and human health and safety.

Currently, active non-federal oil and gas operations are within the boundaries of 12 units of the national park system. The NPS seeks to revise the 9B regulations to reflect current policies, legal requirements, and practices.

PURPOSE OF AND NEED FOR ACTION

The purpose of the proposed revisions to the Title 36 of the CFR 9B regulations is to protect public health and safety; improve understanding, application and effectiveness of the regulations for the NPS and for industry; and incorporate new requirements that will ensure that all non-federal oil and gas operations conducted in national park system units avoid or minimize, to the greatest possible extent, adverse effects on natural and cultural resources, visitor uses and experiences, park infrastructure and management.

The current regulations have been in effect for 36 years and have not been updated during that period. This EIS presents and analyzes the potential impacts of three alternatives: current management (the no-action alternative) and two action alternatives for the regulatory oversight of non-federal oil and gas in

these units. Upon conclusion of the EIS and decision-making process, one of the alternatives could be adopted through a rulemaking process which would guide future non-federal oil and gas development at park units for the foreseeable future.

This EIS is mostly programmatic in nature, which means that it provides a framework for taking a range of actions, but that actions relating to new non-federal oil and gas development would require more site-specific analyses before they could be permitted. Non-federal oil and gas operations currently exist in park units, and site-specific information and analysis are provided in this EIS for currently exempt operations. For new exploration or drilling operations, as well as plugging and reclamation activities, if additional analyses are required, environmental compliance, including an opportunity for public comments, will be completed under a separate National Environmental Policy Act (NEPA) and decision-making process.

PLANNING DIRECTION

The NPS has prepared this EIS pursuant to the NEPA in order to assess potential environmental impacts associated with a range of reasonable alternatives for regulating non-federal oil and gas development impacts on park resources such as geology and soils, air quality, water resources, wetlands, floodplains, vegetation, wildlife and aquatic species, scenic views and night skies, natural soundscapes and the acoustic environment, and cultural resources. Effects on visitor use and experience, park management and operations, and socioeconomics have also been analyzed. Changes to the regulations are expected to affect both current and future non-federal oil and gas operations occurring on NPS administered lands.

This draft rule revision/EIS has been prepared with guidance provided through special mandates and direction. These include the NPS Organic Act, the parks' establishing legislations, park planning documents, and a variety of existing laws, regulations and policies.

Public participation in the scoping process officially began through publication of an Advance Notice of Proposed Rulemaking in the Federal Register (74 FR 61596) on November 25, 2009. The purpose of issuing the Advance Notice of Proposed Rulemaking was to advise the public of the NPS's intent to develop a proposed rule to revise the 36 CFR 9B regulations, and to seek comments and suggestions related to several topics including: regulation of exempt operations; directional drilling beneath parks from surface locations outside parks; operating standards; operator financial assurance; access fees; and assessments for operator noncompliance with the regulations. The NPS also issued an official News Release on December 22, 2009, advising the public on publication of the Advance Notice of Proposed Rulemaking in the Federal Register. On December 30, 2010, the NPS again engaged the public in the scoping process to revise the 36 CFR 9B regulations by publishing a Notice of Intent (NOI) to Prepare an EIS in the Federal Register (75 FR 82362). The NOI specifically solicited public comment on draft purpose and need statements, objectives, and issues and concerns related to revisions of the NPS regulations governing non-federal oil and gas development on units of the national park system. The NOI also requested public comment on possible alternatives the NPS should consider in revising the regulations.

The consultation and coordination process is described in chapter 5. Based on internal and public scoping, the interdisciplinary team developed the following planning objectives and a list of resources and concerns to evaluate in this draft rule revision/EIS.

PLANNING OBJECTIVES

The NPS has identified the following objectives for the revision of the 36 CFR 9B regulations:

- All non-federal oil and gas operations conducted within the authorized boundaries of park units, regardless of ownership and jurisdictional status, are regulated under the 9B regulations in a manner that uses technologically feasible least damaging methods so as to prevent or to minimize damage to national park system resources, visitor values, and management objectives.
- Non-federal oil and gas development in parks is conducted in a manner which ensures, to the maximum extent possible, that all units of the national park system remain unimpaired and resources are conserved for the enjoyment of present and future generations.
- Operating standards are updated to incorporate new scientific findings, technologies, and methods least damaging to park resources and values.
- Both the public and park personnel are protected from health and safety hazards associated with non-federal oil and gas operations.
- Financial assurance provided by non-federal oil and gas operators is adequate to ensure that park resources and values are protected and all operation sites are properly reclaimed.
- The regulations provide a practical and effective means for dealing with minor acts of noncompliance or with illegally conducted operations (unauthorized operations) in parks.
- Operators compensate the United States for use of federally owned land outside the boundary of their non-federal oil and gas property interest.
- The regulations are more understandable to operators, the public, and park staff.
- Regulation of oil and gas wells directionally drilled beneath parks from surface locations outside parks retains the incentive for operators to site such operations outside park boundaries while still maintaining the ability of the NPS to protect park resources and values to the fullest extent practical.

ALTERNATIVES

The NEPA requires federal agencies to explore a range of reasonable alternatives that address the purpose of and need for the action. The alternatives under consideration must include the “no-action” alternative as prescribed by 40 CFR 1502.14. Action alternatives may originate from the proponent agency, local government officials, or members of the public at public meetings or during the early stages of project development. Alternatives may also be developed in response to comments from coordinating or cooperating agencies.

The alternatives analyzed in this document, in accordance with NEPA, are the result of internal and public scoping. These alternatives meet the overall purpose of and need for the proposed action. Alternative elements that were considered but were not technically or economically feasible did not meet the purpose of and need for the project, or created unnecessary or excessive adverse impacts on resources were dismissed from further analysis.

Three alternatives were developed which meet the stated objectives of this draft rule revision/EIS to a large degree and provide a reasonable range of options to manage exploration, drilling, production and transportation of non-federal oil and gas within the parks. These alternatives are described briefly below and presented in greater detail in chapter 2.

ALTERNATIVE A: NO ACTION

Alternative A—No Action is required by the NEPA and describes the continued management of non-federal oil and gas operations in the parks under current 9B regulations. The no-action alternative is the continuation of the 9B regulations as they currently govern the exercise of non-federal oil and gas rights located within units of the national park system. Application of the 9B regulations would continue to be triggered only when an operator’s “access is on, across or through federally owned or controlled lands or waters,” and a total of 78 operations that do not require access on, across, or through federally owned or controlled lands or waters would remain exempt from the 9B regulations. Similarly, 241 operations which are currently exempt from the 9B regulations due to “grandfathered” status, would remain exempt from the 9B regulations. Operators who use directional drilling techniques from a surface location outside a unit of the national park system to reach the bottom hole location of their non-federal oil and gas rights located within NPS boundaries would continue to qualify for an exemption from the regulations. Other current regulatory provisions—including, in particular, those pertaining to Transfers of Interest, Information Requirements, Permit Approval Standards, Operating Standards, Financial Assurance, and Penalties for Prohibited Acts—would remain in place.

ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Alternative B includes proposed changes to the regulations that address gaps in the existing regulation and proposed reformatting of the regulation to improve its workability for both the NPS and operators. To effect these changes, the NPS must comply with applicable rulemaking provisions of the Administrative Procedures Act, 5 USC 551 – 559.

Under alternative B, the 9B regulations would be revised to:

- eliminate the requirement of “access on, across, or through federally owned or controlled lands or waters,” and make the 9B applicable to “all operators conducting non-federal oil or gas operations on lands or waters within an NPS unit, regardless of the ownership or jurisdictional status of those lands or waters” The proposed rule would include a procedure for bringing previously exempt operations into compliance with the 9B regulations.
- add a new section to clarify up front in the regulations that all operators must demonstrate to the NPS that they hold a valid existing right to conduct operations in a unit of the national park system.
- add a new provision that would clarify that an operator must have a temporary access or an operations permit before conducting operations in units of the national park system.
- include a new provision stating that if an operator currently holds an approved plan of operations issued under the existing regulations, the operator may continue to operate subject to applicable provisions of these regulations.
- require all previously grandfathered operations within NPS boundaries to obtain an operations permit.
- identify the basic information necessary for the NPS to evaluate the operator’s proposal.
- include a new stand-alone regulatory section that would address operations accessing oil and gas rights inside a park boundary from a surface location outside the park boundary. This section would provide clarification regarding the process to obtain either an operations permit or an exemption from the 9B regulations for these types of operations.

- establish a new two-stage permit application review process; eliminate the dual approval standards; provide more realistic timeframes to provide notice back to an operator regarding a final decision on their application; and clarify the final decisions the NPS can make on an operator’s permit application.
- present a new format that makes it easier to identify all applicable operating standards for a particular type of operation.
- include new standards in the regulations to ensure that either existing or newly created surface disturbance is kept to the minimum necessary for safe conduct of operations.
- codify existing practice and standards developed and included in the NPS Operator’s Handbook.
- supplement the existing regulation by authorizing a fee for newly established privileged access across federal lands outside the boundary of an operator’s mineral right.
- make the amount of financial assurance equal to the estimated cost of plugging and reclamation.
- ensure that a previous operator would remain liable to the NPS until such time as the new operator either ratifies an operations permit, submits a new permit application, or submits a plan to plug and reclaim, and provides proof of adequate liability insurance and posts adequate financial assurance.
- establish a well plugging determination procedure that considers the operator’s actions with respect to the well after drilling operations cease or after completion of operations.
- eliminate the suspension provision. The NPS would retain authority to suspend an operation or revoke an operations permit, but the proposed rule would grant the superintendent the discretion to use suspension authority regardless of whether an operator’s violation poses an “immediate threat of significant injury.”
- add a new provision that lists the prohibited acts under the regulations in order to give operators and NPS staff notice of the acts that would constitute a violation of the 9B regulations.
- would replace the public notice steps currently required with a new subsection which would clarify that the notice required under NEPA is sufficient as public notice for oil and gas permit applications received by the NPS, and no additional notice would be needed.

Under Alternative B, definitions and other regulatory text would be revised, unnecessary language would be eliminated, and new language would be included to clarify the intent of the regulations. Other current regulatory provisions—including, in particular, those pertaining to Transfers of Interest, Information Requirements, Permit Approval Standards, Operating Standards, Financial Assurance, and Penalties for Prohibited Acts—would also be revised.

ALTERNATIVE C: MODIFIED PROPOSED RULE

Alternative C would include all the proposed changes in alternative B, except as follows.

- The NPS jurisdiction would be expanded under the regulations to encompass surface and subsurface directional drilling operations outside the legislative boundary of the park. Thus, directional drilling operations would be treated the same as new operations.
- The NPS would create a new provision that addresses operations located wholly on non-federally owned lands within a unit of the national park system. This provision would require an operator to submit certain information that would allow the NPS to fully analyze potential impacts on federally owned or administered lands or waters, resources, or visitor health and safety.

- Mineral owners and their lessees would be equally liable for all obligations to comply with the terms and conditions of an approved permit and any other applicable provision under these regulations that accrue while they hold their interests.

ENVIRONMENTAL CONSEQUENCES

Impacts of the alternatives were assessed in accordance with Director’s Order 12 and Handbook: Conservation Planning, Environmental Impact Analysis and Decision-Making. This handbook requires that impacts on park resources be analyzed in terms of their context, duration, and intensity. The analysis provides the public and decision-makers with an understanding of the implications of regulatory revisions in the short and long term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists.

Each alternative was evaluated for overall impacts and compared to the baseline to determine the context, duration, and intensity of resource impacts. The baseline is the condition that has resulted from implementation of the current 9B regulations.

The full impact analysis is in “Chapter 4: Environmental Consequences.” A complete summary of impacts of the alternatives is presented in Table ES-1.

THE NEXT STEP

The public review and comment period for this draft rule revision / EIS will be for 60 days. Written comments on the draft rule revision / EIS will be fully considered and evaluated in preparing the Final Revision of 9B Regulations Governing Non-Federal Oil and Gas Activities / Environmental Impact Statement. A final rule revision / EIS will then be issued, which will be approved by the NPS after a minimum 30-day no-action period. The final rule revision / EIS will include agency and organization letters and responses to all substantive comments.

TABLE ES-1: SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Geology and Soils	<p>Continuing impacts on geology and soils from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites (operations not regulated under the 9B regulations). Adverse effects could include erosion, contamination, change in soil chemistry and productivity, and possible effects on unique geological features if not protected. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on geology and soils. Directionally drilled wells would continue to be a potential source of indirect adverse effects on park soils if they are sited close to the parks and contaminated soils or water leaves the site.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on geology and soils, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts due to erosion or runoff.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on geology and soils in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on geology and soils, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects. Benefits would accrue primarily from reduced risk to geology and soils due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of "immediate threat of significant injury" (grandfathered operations), as was the case under the existing condition. This would result in improved erosion/sedimentation control, storm water management, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B.</p> <p>The extension of regulatory authority and oversight to currently exempt operations would be as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. The extension of NPS regulatory authority to include directionally drilled wells could result in long-term beneficial impacts on geology and soils because NPS standards would apply to locations inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to geology and soils within park units compared to the existing condition.</p> <p>Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>Both adverse and beneficial cumulative impacts would accrue from actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Air Quality	<p>Continuing impacts on air quality from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include vehicles and heavy equipment emissions and nitrogen oxides, volatile organic compounds, carbon monoxide, sulfur dioxide emissions, and odors from operating large engines, pumps and auxiliary equipment. Plugging and reclamation of wells would result in short-term adverse and long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on air quality. Directionally drilled wells would continue to be a potential source of adverse effects, depending on the wind direction, proximity to the park, and mitigation measures employed.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on air quality, due to a possible lack of funding or enforcement that can reduce the ability to ensure lower emission equipment, prolonged VOC emissions from leaking wells, or require that low sulfur diesel is being used.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on air quality in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, whereas adverse effects would accrue from the continued lack of federal regulation governing operation of exempt wells.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on air quality, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Previously exempt operations would be required to obtain an operations permit, which would result in long-term beneficial impacts on air quality from improved operating requirements from those operations. Directionally drilled wells would continue to be a potential source of adverse effects, depending on the wind direction, proximity to the park, and mitigation measures employed, as described under alternative A.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would have potentially beneficial impacts from timely plugging and reclamation, compliance with 9B regulations, and increased monitoring and evaluation of operations compared to the existing condition. There would be short-term adverse impacts on air quality from the use of construction equipment during reclamation activities.</p> <p>When combined with beneficial and adverse impacts from implementation of alternative B, cumulative impacts would be long term and both adverse and beneficial, and proposed 9B regulations would represent only a slight contribution to overall cumulative impacts on air quality in the study area.</p>	<p>Under alternative C, impacts on air quality would also be primarily beneficial when compared to the existing condition. Impacts would be the same as those described under alternative B with the exception of previous exempt operations, directional drilling, and enforcement and penalties.</p> <p>Wells that are currently exempt from the regulations would become subject to standards and review that would provide the indirect benefit of minimizing impacts on air quality through establishing greater protections and emissions standards for equipment, resulting in long-term beneficial impacts. With expanded NPS jurisdiction for directional drilling under alternative C, more operators could be required to adhere to 9B regulations, resulting in the potential for beneficial impacts on air quality. However air quality impacts are felt regionally, so the specific location of directional drilling operations would not change the adverse impact on the airshed, although there may be increased localized impacts from particulates and odors if sites are located in the park.</p> <p>Under alternative C, enforcement and penalties would hold both operators and owners liable for compliance, which would increase the incentive for owners to ensure operators comply with 9B regulations, including all regulations which could reduce impacts on air quality. Therefore, alternative C would have long-term beneficial impacts on air quality.</p> <p>Similar to alternative B, cumulative impacts would be long-term and both adverse and beneficial, with alternative C contributing mostly beneficial impacts from bringing previously exempt operations under regulation.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Water Resources (including surface and groundwaters and both quality and quantity)</p>	<p>Continuing impacts on water resources from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include erosion and sedimentation of water bodies, contamination of water from leaks and spills and possible groundwater contamination from well casing leaks. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have very minimal and generally localized effects on water resources. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated run off leaves the site and enters the park.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have small indirect effects on resources, including water resources, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts due to erosion or runoff.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on water resources in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on water resources, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from reduced risk to water resources due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in improved erosion / sedimentation control, storm water management, spill prevention and countermeasure actions, well plugging standards, and improved standards / required information for well stimulation including hydraulic fracturing operations, compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Overall these regulatory improvements would result in long-term indirect beneficial impacts on water resources.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, similar to alternative B, impacts of the regulatory changes would also be primarily beneficial when compared to the existing condition.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on water resources because NPS standards would apply inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to water resources within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on water resources, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Wetlands	<p>Continuing impacts on wetlands from both regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include continued impacts on the functions and values of the wetland communities, changes to hydrology, impacts on water quality from runoff and sedimentation, stormwater impacts, changes to the abundance and diversity of wetland plant species and wildlife use, and wetland connectivity to adjacent habitats. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on wetlands. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site and enters wetland resources.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including wetlands, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on wetlands in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on wetlands, compared to the existing condition. Previously permitted operations would continue with no change in effects. Benefits would accrue primarily from reduced risk to wetlands due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of "immediate threat of significant injury" (grandfathered operations), as was the case under the existing condition. This would result in improved erosion / sedimentation control, storm water management, improved spill prevention (contamination) and countermeasure actions, as well as reduction in altered hydrology and beneficial effects on wetland function and values, compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, similar to alternative B, impacts of the regulatory changes would also be primarily beneficial, when compared to the existing condition. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on wetlands because NPS standards would apply inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to wetlands within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on wetlands, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Floodplains	<p>Continuing impacts on floodplains from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include erosion (including off-site effects), contamination from spills and improper flood-proofing, altered hydrology, change in soil chemistry and vegetation productivity, and possible effects on floodplains function and values if not protected. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on floodplains.</p> <p>Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site and enters floodplains resources.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including floodplains, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on floodplains in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on floodplains, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from reduced risk to floodplains due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in improved erosion / sedimentation control, storm water management, improved spill prevention (contamination) and countermeasure actions, as well as improvements to hydrology, soil, and vegetation productivity within the floodplain, compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on floodplains because NPS standards would apply inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to floodplains within park units compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on floodplains, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Vegetation (including plant species of special management concern)</p>	<p>Continuing impacts on vegetation from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include erosion (including off-site effects), contamination, introduction of nonnative plant species, change in plant health and productivity, and possible effects on unique geological features that support special status plant species, if not protected. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on vegetation. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including vegetation, due to delays in reclamation or possible lack of funding or enforcement. These factors can increase risk of impacts due to surface water runoff and accelerated soil erosion which can lead to degraded plant communities and habitat within the project area. Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on vegetation in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on vegetation, compared to the existing condition. Previously permitted operations would continue with no change in effects. Benefits would accrue primarily from reduced risk to vegetation due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in removal of contaminated soils, effective erosion control, plugging and capping all nonproductive wells, maintaining areas of operations to avoid or minimize the cause of fire; recontouring and reestablishing native vegetative communities; controlling the invasion of exotic plant species; and overall proper site reclamation. This would result in reduced erosion and contaminated soil exposure, and a reduction in overall damage or loss of vegetation communities and special status plants compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on vegetation because NPS standards would apply inside and outside the parks, especially to plant species of special management concern. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts on vegetation in general within park boundaries following the removal of regulatory incentives to locate operations outside of the park units, although special status plant species would be avoided or protected through consultation. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to vegetation within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on vegetation, primarily from bringing previously exempt operations under regulation. Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Wildlife and Aquatic Species (including animal species of special management concern)	<p>Continuing impacts on wildlife and aquatic species and special-status species from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include loss or disruption of habitat due to vegetation and site clearing, habitat fragmentation, possible injury to or mortality of less mobile species, noise and associated species displacement or stress, and spills or releases of harmful substances. Plugging and reclamation of wells would result in long-term beneficial impacts on wildlife and aquatic species as a result of reclaiming the well pads and access roads of well sites. Impacts on wildlife and aquatic species and special-status species in the park units from directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including wildlife and aquatic species and special-status species, due to delays in reclamation or possible lack of funding or enforcement.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on wildlife and aquatic species and special-status species in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on wildlife and aquatic species and special-status species, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from reduced risk to wildlife due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on wildlife and aquatic species especially to animal species of special management concern, because NPS standards would apply inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries to wildlife in general following the removal of regulatory incentives to locate operations outside of the park units although special status species would be avoided or protected through consultation. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to wildlife within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on wildlife and habitat, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>
Visitor Use and Experience (including	Continuing impacts on visitor use and experience from regulated and exempt operations would be expected, with an	Regulatory revisions would result primarily in long-term indirect beneficial impacts on visitor use and experience, compared to the	Impacts of the regulatory changes would also be primarily beneficial compared to the existing condition, although the change in regulation of directionally drilled

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>human health and safety, visitation patterns, visitor activities, recreation, interpretation)</p>	<p>increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects from these exempt operations would include possible exposure to contamination or safety hazards if sites are not cleaned up or properly secured, visual impacts of sites that may be exacerbated by site erosion and lack of adequate distance between sites and visitor use areas, noise impacts from equipment and crews, again due to the lack of setbacks as well as lack of equipment maintenance or muffling devices. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal effects on visitors. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site or if they can be seen or heard.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have effects on resources that in turn have effects on visitor use and experience. Thus, impacts on visitor use and experience would result from delays in proper reclamation or possible lack of funding or enforcement, which would increase the risk of sites being poorly maintained and free of debris or wastes.</p> <p>Cumulative impacts under the no-action alternative would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on visitor use and experience in the study area.</p>	<p>existing condition. These impacts would occur especially to those visitors who are disturbed by the presence and noise of wells in the parks.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from reduced risk to visitor use and experience due to previously exempt operations being subject to operating standards and mitigation as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in improved site appearance from erosion/sedimentation control, cleanup of spills, wastes and debris, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefit the visitors using and viewing those resources.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>wells could move noise and visual impacts closer to park visitors.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term indirect beneficial impacts visitors if better standards are applied to wells drilled on park boundaries. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to visitors within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefits the visitors that use or view those resources.</p> <p>The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on visitor use and experience, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Scenic Views and Night Sky Resources</p>	<p>Continuing impacts on scenic views and night sky resources from regulated and exempt operations would be expected. Light pollution can impact human perception of the night sky, natural landscape, ecological processes and wildlife interactions. The risk of impacts of artificial lighting would be more severe or extensive from access-exempt or grandfathered sites. Adverse effects would include visual impacts of sites that may be exacerbated by site erosion and lack of adequate distance between sites and visitor use areas or intrusion of artificial lighting and flaring on night sky resources. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal effects on scenic views and the night sky. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site or if they can be seen. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have effects on resources that in turn have effects on the scenic views and night sky resources. Thus, impacts on scenic views and night sky resources would occur as a result of delays in proper reclamation or possible lack of funding or enforcement, which would increase the risk of sites being poorly maintained and free of debris or wastes. Cumulative impacts under the no-action alternative would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on scenic</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on scenic views and night sky resources, compared to the existing condition. Light pollution can impact human perception of the night sky, natural landscape, ecological processes and wildlife interactions. The impacts of artificial lighting have been documented at long distances. Previously permitted operations would continue with no change in effects. Benefits would accrue due to previously exempt operations being subject to operating standards and mitigation as opposed to no standards (access-exempt operations), or a standard of "immediate threat of significant injury" (grandfathered operations), as was the case under the existing condition. This would result in improved site appearance from erosion/sedimentation control, cleanup of spills, wastes and debris, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition. Keeping artificial lighting to a minimum and using directional shielded lighting would reduce impacts on night sky resources. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition and funding sources that could indirectly benefit resources at the parks, which indirectly benefit scenic views and night sky resources. Overall these regulatory improvements would result in long-term indirect beneficial impacts on scenic views and night sky resources compared to the existing condition. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly</p>	<p>Impacts of the regulatory changes would also be primarily beneficial compared to the existing condition although the change in regulation of directionally drilled wells could move visual impacts closer to the park units. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term indirect beneficial impacts on scenic views and especially night sky resources if better standards (e.g., reduced or shielded lighting requirements) are applied to wells drilled on park boundaries; however, regulating directional drilling could potentially result in a greater concentration of adverse impacts of having wells located within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to scenic views within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefits visual resources and night sky resources. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on scenic views and night sky resources, primarily from bringing previously exempt operations under regulation. Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
	views and night sky resources in the study area.	beneficial impacts to overall cumulative impacts from the change in regulations.	
Natural Soundscapes and Acoustic Environment	<p>Continuing impacts on soundscapes and the acoustic environment from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects would include poorly maintained and noisy production equipment and lack of mitigating features (e.g., noise enclosures, noise barriers, relocation, equipment retrofits). Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on soundscapes and the acoustic environment. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks.</p> <p>The lack of penalties would result in less incentive for operators to meet NPS operating standards, such as installing mufflers or equipment with lower noise levels. This could result in more intense impacts on soundscapes and the acoustic environment.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on soundscapes and the acoustic environment in the study area.</p>	<p>Regulatory revisions would result primarily in long-term beneficial impacts on soundscapes and acoustic environment, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from the increased ability on the part of NPS to request and enforce the least damaging standard (as opposed to no standards) including proper maintenance of production equipment and placement of noise mitigation measures (e.g., mufflers, noise barriers, enclosures, retrofits, and quieter equipment). This would result in fewer noise and sound impacts compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands and resources, including soundscapes and the acoustic environment. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on soundscapes and the acoustic environment. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C could create additional long-term, direct adverse impacts to natural soundscapes within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on soundscapes and the acoustic environment, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Cultural Resources (including archeological sites, prehistoric/historic structures, cultural landscapes, ethnographic resources)</p>	<p>Continuing impacts on cultural resources from both regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects would include possible risks of the destruction of cultural resources or the degradation of their integrity and visual impacts of sites that may be exacerbated by site erosion and lack of adequate distance between sites and areas of intensive cultural resource presence. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal effects on cultural resources. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site or if they can be seen, thereby disrupting cultural landscapes.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have minimal indirect effects on cultural resources, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of having sites that are not maintained free of debris or wastes or properly reclaimed in a timely manner.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on cultural resources in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on cultural resources, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from reduced risk to cultural resources due to previously exempt operations being subject to “least damaging” and other operating standards and protocols for section 106 NHPA consultation as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in improved site appearance from erosion/sedimentation control, cleanup of spills, wastes and debris, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefit the visitors using and viewing those resources.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Impacts of the regulatory changes would also be primarily beneficial compared to the existing condition, although the change in regulation of directionally drilled wells could move some potential risks to cultural resources into parks that might otherwise be avoided.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts because NPS standards would apply inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to cultural resources within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit cultural resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on cultural resources, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Park Management and Operations	<p>Current implementation practices among park resource specialists pertaining to the 9B regulations would continue and there would be no change in the administration of currently regulated and exempt operations. Thus, alternative A would result in no change to park management and operations. The costs to the NPS in terms of staff and resources of ensuring operational compliance with 9B requirements would continue under alternative A, and would result in long-term adverse impacts on park management and operations, although these impacts would be minimal.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have the potential for additional administrative burden and expanded responsibilities placed upon NPS park resource specialists and would result in adverse effects to park operations and management.</p> <p>Alternative A would contribute only slightly to adverse cumulative impacts occurring to park management and operations as a result of cumulative plans and actions.</p>	<p>Under alternative B, the administration of the 9B regulations to previously exempt operations would require the use of park staff and resources, resulting in an increased administrative burden and adverse impacts on park management and operations compared to the existing condition. However, any additional responsibilities involved in addressing new operations would fall under the existing workload of dedicated park and central office resource protection specialists. Previously permitted operations would continue with no change in effects.</p> <p>However, provisions for cost recovery and compensation for access across federally owned lands would result in the potential for a reduced financial and administrative burden, resulting in long-term beneficial impacts on park management and operations. Additionally, any additional administrative responsibilities related to implementing the 9B regulations under alternative B would fall under the existing workload of dedicated park resource protection specialists and would not require additional full-time equivalent (FTE) or other administrative or material resources.</p> <p>Within the broader context of all cumulative plans and actions affecting park management and operations, implementation of alternative B would contribute a small but noticeable amount to adverse and beneficial cumulative impacts. Impacts would likely be greater to park operations for those units with a high number of current and/or exempt operations and for those units which exhibit a greater potential for future operations due, for instance, to their proximity to Marcellus shale.</p>	<p>Under alternative C, similar to alternative B, the additional administrative burden incurred from the application of 9B regulations to directionally drilled operations may result in direct adverse impacts on park management and operations when compared to the existing condition.</p> <p>The addition of directionally drilled operations that would previously have opted to locate outside of park boundaries but may now be located within the park would further contribute additional responsibilities involved in attending to new operations, and would increase the existing workload of dedicated park resource protection specialists but would not likely require additional FTE or other administrative or material resources. Any additional responsibilities involved in addressing new operations would fall under the existing workload of dedicated park and central office resource protection specialists. Provisions for cost recovery and compensation for access across federally owned lands would result in the potential for a reduced financial and administrative burden, resulting in long-term beneficial impacts on park management and operations. The potential degree of administrative burden would increase under alternative C, as both operations previously exempt from the 9B regulations as well as those operations utilizing directional drilling to access private minerals under the incentive to locate outside of the park administrative boundaries, would require the regulatory oversight of the NPS.</p> <p>The contribution to cumulative impacts of alternative C would be small but noticeable, given the wider context of cumulative actions affecting park management and operations.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Socio-economics (including non-federal oil and gas exploration and development, and regional and local economics)</p>	<p>There would be no change in effects on operator costs and local and regional economies from what is currently occurring. Implementation of the current 9B regulations on regulated operations is likely having adverse impacts on costs for operations in the seven category 1 park units, while exempt operations do not incur these regulatory costs. The no-action alternative would continue to have adverse effects on operator costs and financial viability for currently regulated operations into the foreseeable future. As wells come to the end of their productive life, there are additional plugging and reclamation costs anticipated to affect four operations per year, which could be considerable for operators as these costs can become economically significant as production declines and profit margins decrease.</p> <p>Financial assurance and financial liability requirements and enforcement and penalties would continue under current conditions, with no to minimal adverse impacts on most operator costs relative to overall operator costs, and no impacts on local and regional economies. Minimal compensation for access across federally owned lands would continue to benefit operator access costs.</p> <p>The contribution to cumulative impacts of the no-action alternative would be slight given the considerable oil and gas development occurring in the regions outside of park boundaries, additional federal, state, and local oil and gas permitting and operational requirements, and the many other cumulative actions affecting operator costs and local and regional economies.</p>	<p>Similar to alternative A, new operations under alternative B would have an incentive to locate their operations outside park boundaries (directionally drilling wells) to avoid NPS and other federal requirements, delays in permitting, and costs.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>New operations under alternative B, the same as experienced under existing conditions, would have possible considerable adverse effects to a few operators to comply with 9B permitting and development standards. Transfer of interest and financial liability of operators, compensation for federal access, and enforcement and penalties provisions under alternative B would have no to slight adverse impacts on operator costs and no noticeable impact on local and regional economies. Special use permits would allow the NPS to recover fees for processing permits and for park maintenance and other impacts. These fees would be expected to adversely affect costs to new operations, although these costs are small relative to the total costs of permitting, drilling, and completing wells.</p> <p>Cumulative actions, in combination with alternative B, could add to project costs affecting the viability of marginal and idle wells, resulting in additional plugging and reclamation of wells and major adverse impact to operators with multiple wells to plug and reclaim. The contribution to the cumulative impacts on local and regional economies of alternative B would be slight given the considerable oil and gas development and production occurring in adjacent regions and the many other cumulative actions affecting the local and regional economies.</p>	<p>Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.</p> <p>Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations if operations have “no effect on the federal interest.” Impacts on costs to operators would be similar as those described for alternative B, although slightly less, with small adverse effects on operator costs and project financial viability and no impacts on local and regional economies. Alternative C would require directionally drilled operations outside park boundaries to comply with 9B requirements, and adverse effects on compliance costs for these operations would also be incurred under alternative C. The incremental effect on operator costs per operation is assumed to be the same as those described under alternative B, with adverse effects on operator costs for permitting and meeting operating standards. Additionally, operators would not have the cost incentive to locate new operations outside of the park boundaries. As a result, there could be many new operations that would have been directionally drilled outside of the park boundary to access mineral resources now choosing to locate these wells within the park boundaries since the 9B compliance costs and delays would be incurred in either location.</p> <p>Under alternative C, the enforcement and penalties provision would be similar to alternative B, although the provision under alternative C would hold mineral owners and operators jointly and severally liable for obligations to comply with permit conditions and the regulations. The proposed penalty provisions are expected to motivate noncompliant operators, as well as mineral owners, to respond quickly to avoid penalties. Similar to alternative B, these enforcement penalties would have negligible adverse impacts on operator costs, project financial viability, or local and regional economies.</p> <p>The contribution to cumulative impacts of alternative C would be slight given the considerable oil and gas development occurring in the regions and the many other cumulative actions affecting the local and regional economies.</p>

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Acronyms

ARRA	American Recovery and Reinvestment Act
BLM	U.S. Bureau of Land Management
CEQ	Council on Environmental Quality
DOI	U.S. Department of the Interior
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FTE	full-time equivalent
GIS	Geographic Information System
GMP	general management plan
GRD	Geologic Resources Division
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOI	notice of intent
NPS	National Park Service
ORV	off-road vehicle
PEPC	planning, environment, and public comment
PSRPA	Park System Resource Protection Act
PSD	prevention of significant deterioration
ROD	record of decision
SHPO	State Historic Preservation Office
SMA	sensitive management area
UNESCO	United Nations Educational, Scientific and Cultural Organization
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

Abbreviations of National Park Names

ALFL	Alibates Flint Quarries National Monument
AZRU	Aztec Ruins National Monument
BICY	Big Cypress National Preserve
BISO	Big South Fork National River and Recreation Area
BITH	Big Thicket National Preserve
BLUE	Bluestone National Scenic River
CARI	Cane River Creole National Historic Par
CAVE	Carlsbad Caverns National Park
CUGA	Cumberland Gap National Historic Park
CUVA	Cuyahoga Valley National Park
DINO	Dinosaur National Monument
EVER	Everglades National Park
FLNI	Flight 93 National Memorial
FONE	Fort Necessity National Battlefield
FOUS	Fort Union Trading Post National Historic Site
FRHI	Friendship Hill National Historic Site
GARI	Gauley River National Recreation Area
GLCA	Glen Canyon National Recreation Area
GRSA	Great Sand Dunes National Park and Preserve
GRTE	Grand Teton National Park
GUIS	Gulf Islands National Seashore
GUMO	Guadalupe Mountains National Park
HOCU	Hopewell Culture National Historic Park
INDU	Indiana Dunes National Lakeshore
JELA	Jean Lafitte National Historic Park and Preserve
JOFL	Johnstown Flood National Memorial
LAMR	Lake Meredith National Recreation Area
LIRI	Little River Canyon National Preserve
MACA	Mammoth Cave National Park
MEVE	Mesa Verde National Park
NERI	New River Gorge National River
NICO	Nicodemus National Historic Site
OBED	Obed Wild and Scenic River
PAAL	Palo Alto Battlefield National Historic Site
PAIS	Padre Island National Seashore

SAAN	San Antonio Missions National Historical Park
SAMO	Santa Monica Mountains National Recreation Area
SAND	Sand Creek Massacre National Historic Site
STEAMTOWN	Steamtown National Historic Site
THRO	Theodore Roosevelt National Park
UPDE	Upper Delaware Scenic and Recreational River
WABA	Washita Battlefield National Historic Site

Chapter 1

Purpose of and Need for Action



CHAPTER 1: PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

This “Purpose of and Need for Action” chapter describes why the National Park Service (NPS) is taking action at this time. The NPS evaluated a range of alternatives for the revision of the “9B regulations” governing non-federal oil and gas development within the boundaries of units of the national park system. The current regulations have been in effect for over 36 years and have not been updated during that period. The NPS has prepared this environmental impact statement (EIS) pursuant to the National Environmental Policy Act (NEPA) in order to assess potential environmental impacts associated with a range of reasonable alternatives for regulating non-federal oil and gas development impacts on park resources such as geology and soils, air quality, water resources, wetlands, floodplains, vegetation, wildlife and aquatic species, scenic views and night sky resources, natural soundscapes and the acoustic environment, and cultural resources. Effects on visitor use and experience, park management and operations, and socioeconomics have also been analyzed. Changes to the regulations are expected to affect both current and future non-federal oil and gas operations occurring on NPS administered lands.

This EIS presents and analyzes the potential impacts of three alternatives: current management (the no-action alternative) and two action alternatives for the regulatory oversight of non-federal oil and gas in these units. Upon conclusion of the EIS and decision-making process, one of the alternatives could be adopted through a rulemaking process which would guide future non-federal oil and gas development at park units for the foreseeable future.

This EIS is mostly programmatic in nature, which means that it provides a framework for taking a range of actions, but that actions relating to new non-federal oil and gas development would require more site-specific analyses before they could be permitted. Non-federal oil and gas operations currently exist in park units, and site-specific information and analysis are provided in this EIS for currently exempt operations. For new exploration or drilling operations, as well as plugging and reclamation activities, if additional analyses are required, environmental compliance, including an opportunity for public comments, will be completed under a separate NEPA and decision-making process.

PURPOSE AND NEED FOR ACTION

As defined by NPS Director’s Order 12 Handbook: Conservation Planning, Environmental Impact Analysis, and Decision Making, the purpose of an action is a broad statement of goals and objectives that the NPS intends to fulfill by taking action (NPS 2005). Need is defined as a discussion of existing conditions that need to be changed, problems that need to be remedied, decisions that need to be made, or policies or mandates that need to be implemented. Need is why action is being taken at this time. The following purpose and need statements were developed by the NPS for this EIS with input from the public and other agencies. Additional information that supports the purpose and need is provided throughout the other sections of this chapter.

PURPOSE OF THE REGULATION REVISION

The purpose of the proposed revisions to the Title 36 of the Code of Federal Regulations (CFR) 9B regulations is to protect public health and safety; improve understanding, application and effectiveness of the regulations for the NPS and for industry; and incorporate new requirements that will ensure that all non-federal oil and gas operations conducted in national park system units avoid or minimize, to the

greatest possible extent, adverse effects on natural and cultural resources, visitor uses and experiences, park infrastructure and management.

NEED FOR ACTION

The NPS has identified the following reasons for proposing revisions to the existing 9B regulations:

- The NPS cannot regulate 319 (60 percent) out of 534 non-federal oil and gas wells currently within the authorized boundaries of parks due to exemptions included in the existing regulations (e.g., operations that do not require access across federally owned lands or waters, or “grandfathered operations”).
- The existing regulations limit the ability of the NPS to require adequate financial assurance from operators to ensure that adequate funds are available to properly reclaim operation sites in the event operators fail to fulfill their obligations under an approved plan of operations.
- The NPS has limited means under the existing regulations to address minor violations of an approved plan of operations or the 9B regulations that do not rise to the level of issuing a suspension order to the operator.
- The existing regulations do not clearly state the scope of NPS jurisdiction for directional oil and gas wells drilled beneath parks from a surface location on lands or waters outside park boundaries.
- The existing regulations are not consistent with practices of other federal agencies and private landowners concerning compensation for privileged access across federally owned lands beyond the boundary of an operator’s non-federal oil and gas property interest.
- The existing regulations do not provide a means for the NPS, as appropriate, to recover the costs for processing applications and monitoring non-federal oil and gas operations in parks.
- There is an opportunity to codify a more understandable, contemporary, comprehensive, and enforceable set of operating standards and practices than the NPS currently uses in guidance to operators.

OBJECTIVES IN TAKING ACTION

Objectives are “what must be achieved to a large degree for the action to be considered a success” (Director’s Order 12 Handbook). All alternatives selected for detailed analysis must meet all objectives to a large degree, as well as resolve purpose and need for action. Objectives for adequate regulatory oversight of non-federal oil and gas operations on NPS lands must be grounded in the enabling legislation, purpose, significance, and mission goals of the park units affected under the proposed revisions.

The NPS has identified the following objectives for the revision of the 9B regulations:

- All non-federal oil and gas operations conducted within the authorized boundaries of park units, regardless of ownership and jurisdictional status, are regulated under the 9B regulations in a manner that uses technologically feasible least damaging methods so as to prevent or to minimize damage to national park system resources, visitor values, and management objectives.
- Non-federal oil and gas development in parks is conducted in a manner which ensures, to the maximum extent possible, that all units of the national park system remain unimpaired and resources are conserved for the enjoyment of present and future generations.

- Operating standards are updated to incorporate new scientific findings, technologies, and methods least damaging to park resources and values.
- Both the public and park personnel are protected from health and safety hazards associated with non-federal oil and gas operations.
- Financial assurance provided by non-federal oil and gas operators is adequate to ensure that park resources and values are protected and all operation sites are properly reclaimed.
- The regulations provide a practical and effective means for dealing with minor acts of noncompliance or with illegally conducted operations (unauthorized operations) in parks.
- Operators compensate the United States for use of federally owned land outside the boundary of their non-federal oil and gas property interest.
- The regulations are more understandable to operators, the public, and park staff.
- Regulation of oil and gas wells directionally drilled beneath parks from surface locations outside parks retains the incentive for operators to site such operations outside park boundaries while still maintaining the ability of the NPS to protect park resources and values to the fullest extent practical.

PURPOSE AND SIGNIFICANCE OF UNITS OF THE NATIONAL PARK SYSTEM

All units of the national park system are formed for a specific purpose and to preserve significant resources or values for the enjoyment of future generations. The purpose and significance of each park unit is usually identified in its enabling or authorizing legislation or in park-specific planning documents. The most important statutory directives for the NPS are provided by interrelated provisions of what are commonly known as the NPS Organic Act of 1916 (54 USC 100101) and the NPS General Authorities Act of 1970 (54 USC 100752), including amendments to the latter law enacted in 1978.

The key management-related provision of the Organic Act is as follows:

[The National Park Service] shall promote and regulate the use of the National Park System by means and measures that conform to the fundamental purpose of the System units, which purpose is to conserve the scenery, natural and historic objects, and wild life in the System units and to provide for the enjoyment of the scenery, natural and historic objects, and wild life in such manner and by such means as will leave them unimpaired for the enjoyment of future generations. (54 USC 100101)

Congress supplemented and clarified the NPS Organic Act through enactment of the General Authorities Act in 1970, and again through enactment of a 1978 amendment to that act (the “Redwood amendment,” contained in a bill expanding Redwood National Park), which added the last two sentences in the following provision. The key part of that act, as amended, is as follows:

(b) DECLARATIONS.—

(1) 1970 DECLARATIONS.—Congress declares that—

(A) the National Park System, which began with establishment of Yellowstone National Park in 1872, has since grown to include superlative natural, historic, and recreation areas in every major region of the United States and its territories and possessions;

(B) these areas, though distinct in character, are united through their interrelated purposes and resources into one National Park System as cumulative expressions of a single national heritage;

(C) individually and collectively, these areas derive increased national dignity and recognition of their superb environmental quality through their inclusion jointly with each other in one System preserved and managed for the benefit and inspiration of all the people of the United States; and

(D) it is the purpose of this division to include all these areas in the System and to clarify the authorities applicable to the System.

(2) 1978 REAFFIRMATION.—Congress reaffirms, declares, and directs that the promotion and regulation of the various System units shall be consistent with and founded in the purpose established by subsection (a), to the common benefit of all the people of the United States. The authorization of activities shall be construed and the protection, management, and administration of the System units shall be conducted in light of the high public value and integrity of the System and shall not be exercised in derogation of the values and purposes for which the System units have been established, except as directly and specifically provided by Congress. (54 USC 100752)

The fundamental purpose of the national park system, established by the NPS Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources and values, even when there is no risk that any park resources or values may be impaired. NPS managers must always seek ways to avoid, or to minimize to the greatest extent practicable, adverse impacts on park resources and values. However, the laws do give the NPS the management discretion to allow impacts on park resources and values, when necessary and appropriate, to fulfill the purposes of a park so long as the impact does not constitute impairment of the affected resources and values.

The fundamental purpose of all parks also includes providing for the public enjoyment of park resources and values. The enjoyment that is contemplated by the statute is broad; it is for public enjoyment and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant. This is how courts have consistently interpreted the Organic Act.

BACKGROUND

NON-FEDERAL OIL AND GAS DEVELOPMENT IN UNITS OF THE NATIONAL PARK SYSTEM

The types of non-federal oil and gas development activities conducted in units of the national park system generally include geophysical (seismic) exploration; exploratory well drilling; field development well drilling; oil and gas well production operations, including installation and operation of well flowlines and gathering lines; well plugging and abandonment; and surface restoration. Each of these types of development has or continues to occur in each of the 12 “category 1” park units. Appendix A presents a

description of each type of operation that typically occurs during exploration and production of oil and gas resources.

Currently, active non-federal oil and gas operations are within the boundaries of 12 units of the national park system. The NPS seeks to revise the regulations to reflect current policies, legal requirements, and practices. The existing regulations are published at 36 CFR Part 9, Subpart B (“9B regulations”). Appendix B presents the existing 9B regulations. Under authority granted by Congress, the 9B regulations were promulgated in 1978 with an effective date of January 8, 1979. These regulations were promulgated to ensure that all non-federal oil and gas operations in parks are conducted in a manner consistent with the purposes for which the national park system and each affected park unit was created.

36 CFR 9B REGULATIONS

Non-federal oil and gas development in units of the national park system is permitted only where (1) a non-federal mineral right exists and the exercise of such a right is not specifically prohibited by Congress; (2) actions would not impair or cause unacceptable impacts on park resources, values, or purposes; and (3) the conduct of such activity is performed in accordance with all applicable federal, state and local laws and regulations, and NPS policies. The NPS ensures that non-federal oil and gas development in parks complies with these legal and policy requirements through application of the 9B regulations.

The legal authority for the NPS to promulgate the 9B regulations is derived from the Property Clause [Art. IV, 3 (2)] and Commerce Clause [Art. I, 8 (3)] of the United States Constitution, and from statutes enacted by Congress for the administration of the national park system. The Property Clause provides that “Congress shall have Power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States...” Congress’ power over federally owned lands is without limitations, and extends to conduct that occurs on or off federal land that affects federal lands. Courts have consistently upheld Congress’ broad delegation of authority to federal land managing agencies under the Property Clause in a variety of contexts.

Congress exercised its power under the Property Clause and passed the NPS Organic Act of 1916, which directed the NPS through the Secretary of the Interior, to “promote and regulate” units of the national park system “to conserve the scenery, natural and historic objects, and wild life in the System units and to provide for the enjoyment of scenery, natural and historic objects, and wild life in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (54 USC 100101). Congress also mandated that the protection, management, and administration of such units “shall be conducted in light of the high public value and integrity of the System and shall not be exercised in derogation of the values and purposes for which these System units have been established, except as directly and specifically provided by Congress” (54 USC 100752). Congress further authorized the Secretary of the Interior to “prescribe such regulations as the Secretary considers necessary or proper for the use and management of the System units” (54 USC 100751), which includes the authority to regulate non-federal oil and gas activities within park boundaries for the purpose of protecting park resources and values.

The enabling statutes for several individual parks (including Big Thicket National Preserve, Big Cypress National Preserve, Padre Island National Seashore, Jean Lafitte National Historic Park, and Big South Fork National River and Recreation Area) also contain specific provisions authorizing the NPS to regulate non-federal oil and gas activities occurring within park boundaries. Although not all parks with non-federal oil and gas development occurring within their boundaries have such specific direction in their enabling statutes, the NPS Organic Act authority alone is legally sufficient to authorize the promulgation of the 9B regulations.

The 9B regulations govern all activities that are associated with the exploration and development of non-federal oil and gas rights located within park boundaries where access is on, across, or through federally owned or controlled lands or waters. Under the existing regulations, an entity seeking to undertake non-federal oil and gas activities in a park generally must submit and obtain NPS approval of a proposed plan of operations before commencing operations inside a park. A plan of operations is essentially a prospective operator's blueprint of all intended activities within the boundary of the park including exploration, drilling, production, transportation, and reclamation. The regulations require the operator to provide documentation demonstrating that the operator is exercising a bona fide property right to non-federal oil and gas in the park unit. In a proposed plan of operations, an operator must identify the specific measures that will be undertaken to protect park resources and values. Finally, an operator must submit a performance bond for the principal purpose of ensuring that funds will be available to reclaim a site should an operator default on its obligations under a plan.

The plan of operations requirement is the primary tool for protecting park resources and values from potential adverse impacts associated with the non-federal oil and gas rights inside park boundaries. In reviewing a proposed plan of operations to determine whether the NPS can approve an operation, the NPS undertakes a variety of analyses required by federal statutes, such as the NEPA, the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA), and the standards specified in the 9B regulations. In analyzing proposed plans, the NPS coordinates and consults with other regulatory agencies at the federal and state level. The NPS also works closely with the operator in order to address park protection concerns through the incorporation of appropriate mitigation measures into plans.

Once the NPS has completed its review and environmental compliance responsibilities and determined that a given proposal meets applicable regulatory requirements and approval standards, the NPS will approve an operator's plan of operations. The approved plan authorizes the operator to conduct its operation in a unit of the national park system. If an operator's plan of operations contains all required information but fails to meet the approval standards of the regulations, the NPS generally has authority to deny the operation and may initiate acquisition of the specific non-federal oil and gas right. However, it is important to note that application of the 9B regulations is not intended to result in a taking of the property interest, but rather to impose reasonable regulation of the non-federal oil and gas activity to meet the statutory requirements of the NPS.

During the life of an approved oil and gas operation in a park, park resource managers monitor activities at the operator's site to ensure compliance with the plan. The existing 9B regulations also authorize the NPS to enforce the terms of the plan as may be necessary via such means as suspension of operations or revocation of the plan approval.

While non-federal oil and gas operators in parks must also comply with state requirements, the 9B regulations differ from most state oil and gas regulations by focusing on the protection of the park's natural and cultural resources and visitors. Some state oil and gas regulations may contain provisions protecting surface resources, but state oil and gas regulations mainly focus on conservation of the oil and gas resource, protection of the associated ownership interests, and protection of groundwater and surface water.

Over the last 36 years, implementation of the existing 9B regulations to proposed operations has allowed the NPS and non-federal oil and gas operators to protect park resources and human health and safety while recognizing the exercise of non-federal oil and gas rights in parks. However, during the years of implementing the 9B regulations, the NPS has become increasingly aware of several issues that would require specific changes to the regulations in order to improve understanding, efficiency, enforcement, and resource protection in parks. In addition, the oil and gas exploration and development industry has made significant advances in technology and practices over the last 36 years since the 9B regulations

were initially promulgated (these include three-dimensional geophysical exploration, extended-reach directional and horizontal drilling capability, and use of containerized drilling fluid systems), and the proposed revisions are designed to reflect such advances, particularly with respect to protection of park natural and cultural resources, and human health and safety.

NON-FEDERAL OIL AND GAS RIGHTS IN PARKS AND PROJECT STUDY AREA

The United States does not always possess all ownership rights in all lands within the authorized boundary of national park system units. Within park boundaries, entities other than the United States can own either the surface estate, mineral estate, or both. Non-federal rights to oil and gas minerals within the authorized boundary of parks arise in three types of situations: (1) the United States does not own a specific tract or parcel of land, including the oil and gas mineral estate beneath such land; (2) when the United States acquired the specific tract or parcel of land, the seller reserved the rights to the oil and gas estate; or (3) the estate is already severed when the United States acquired the surface estate and the mineral rights remain with the previous owner. The second and third situations are more commonly known as a “split estate.”

When the United States owns the surface estate, but not the mineral estate, the mineral owner has the right of reasonable use of the federally owned surface to explore and develop the oil and gas minerals. Non-federal oil and gas rights may be owned by individuals, corporations, native corporations, partnerships, Indian tribes, nonprofit organizations, and state and local governments. Such rights are a form of real property and fall under the protection of the 5th Amendment to the U.S. Constitution, which states, “No person shall be ...deprived of ... property, without due process of law; nor shall private property be taken for public use, without just compensation.” The NPS nonetheless may regulate the exercise of these property rights in parks pursuant to the authority described in the 9B regulations section earlier in this chapter. That is, the 9B regulations apply reasonable time, place, and manner avoidance and mitigation measures to the exercise of mineral rights, but do not deny the operator access.

Some non-federal oil and gas mineral rights are known to exist in at least 42 national park system units (figure 1). However, exploration and development of such rights in some of these parks is unlikely based on the lack of conditions favorable for oil and gas development (e.g., reservoir, source rock, and presence of hydrocarbons) and the presence of relatively small non-federal oil and gas mineral rights acreage in the parks.

There is current development of non-federal oil and gas rights in 12 of the identified 42 parks. The 12 park units with active development are classified as “category 1” in table 1. Currently, there are 534 non-federal oil and gas wells in these 12 parks, and additional exploration and development in most of these parks is likely in the future.

Development of non-federal oil and gas rights is possible at an additional 30 park units in the future based upon the following factors: (1) oil and gas resources are present in close proximity or within the authorized boundaries of the park; (2) oil and gas development is occurring near the parks, and (3) non-federal oil and gas mineral rights acreage in the parks is large enough to support development activity. These 30 park units are classified as “category 2” in table 1. Future non-federal oil and gas development in these parks is largely dependent upon economic factors.

Although the proposed revisions to the 9B regulations would apply to development of non-federal oil and gas rights that may exist in any of the 402 national park system units, this impact analysis will focus on the anticipated environmental effects in the 42 parks listed in table 1.

TABLE 1. PARK UNIT AFFECTED BY PROPOSED REVISIONS TO NPS NON-FEDERAL OIL AND GAS REGULATIONS

Park Unit	Abbreviation	State	Petroleum Resource			Category
			Oil and Gas	Coalbed Methane	Oil/Gas Shale and Tar Sands	
Category 1 Park Units^a						
Alibates Flint Quarries National Monument	ALFL	TX	X			1
Aztec Ruins National Monument	AZRU	NM	X	X	X	1
Big Cypress National Preserve	BICY	FL	X			1
Big South Fork National River and Recreation Area	BISO	KY, TN	X	X	X	1
Big Thicket National Preserve	BITH	TX	X			1
Cumberland Gap National Historic Park	CUGA	KY, TN, VA	X			1
Cuyahoga Valley National Park	CUVA	OH	X	X	X	1
Gauley River National Recreation Area	GARI	WV	X	X	X	1
Lake Meredith National Recreation Area	LAMR	TX	X			1
New River Gorge National River	NERI	WV	X	X	X	1
Obed Wild and Scenic River	OBED	TN	X	X	X	1
Padre Island National Seashore	PAIS	TX	X			1
Total Category 1 Park Units						12
Category 2 Park Units^b						
Bluestone National Scenic River	BLUE	WV	X	X	X	2
Cane River Creole National Historic Par	CARI	LA	X			2
Carlsbad Caverns National Park	CAVE	NM	X			2
Dinosaur National Monument	DINO	CO, UT	X	X	X	2
Everglades National Park	EVER	FL	X			2
Flight 93 National Memorial	FLNI	PA	X	X	X	2
Fort Necessity National Battlefield ^c	FONE	PA	X	X	X	2
Fort Union Trading Post National Historic Site ^c	FOUS	ND, MT	X	X	X	2
Friendship Hill National Historic Site	FRHI	PA	X	X	X	2
Glen Canyon National Recreation Area	GLCA	UT			X	2
Grand Teton National Park	GRTE	WY		X		2
Great Sand Dunes National Park and Preserve	GRSA	CO	X			2
Guadalupe Mountains National Park	GUMO	TX	X		X	2
Gulf Islands National Seashore	GUIS	MS	X			2
Hopewell Culture National Historic Park	HOCU	OH	X	X	X	2

Park Unit	Abbreviation	State	Petroleum Resource			Category
			Oil and Gas	Coalbed Methane	Oil/Gas Shale and Tar Sands	
Indiana Dunes National Lakeshore	INDU	IN	X	X		2
Jean Lafitte National Historic Park and Preserve ^c	JELA	LA	X			2
Johnstown Flood National Memorial	JOFL	PA		X	X	2
Little River Canyon National Preserve	LIRI	AL	X	X		2
Mammoth Cave National Park	MACA	KY	X			2
Mesa Verde National Park	MEVE	CO	X	X	X	2
Nicodemus National Historic Site	NICO	KS	X			2
Palo Alto Battlefield National Historic Site	PAAL	TX	X			2
San Antonio Missions National Historical Park	SAAN	TX	X			2
Sand Creek Massacre National Historic Site	SAND	CO	X			2
Santa Monica Mountains National Recreation Area	SAMO	CA	X		X	2
Steamtown National Historic Site	STEA	PA			X	2
Theodore Roosevelt National Park	THRO	ND	X	X	X	2
Upper Delaware Scenic and Recreational River	UPDE	PA			X	2
Washita Battlefield National Historic Site ^c	WABA	OK	X			2
Total Category 2 Park Units						30

^aCategory 1 = Non-federal oil and gas operations occurring in the park.

^bCategory 2 = Park is located within or very near known petroleum development and oil and gas development activity is occurring near the park.

^cDenotes category 2 parks that have had non-federal oil and gas development activity (e.g., permitting, seismic, exploration drilling) within the past 10 years, but do not have active operations at present.

RELEVANT ISSUES PERTAINING TO NON-FEDERAL OIL AND GAS IN PARK UNITS

The following discussion presents a summary of the current operational, financial, and environmental issues that arise as a result of existing legislation and provides rationale for the revisions to the 9B regulations and the analyses presented in this EIS. It includes a description of exempt operational status for wells, constraints on the NPS regulatory jurisdiction, financial aspects of operations, and new operating technologies allowing directional drilling for longer distances than that which was previously possible.

EXEMPT OPERATIONS

As previously noted, 12 units of the national park system currently have non-federal oil and gas development within their authorized boundaries. A total of 534 non-federal oil and gas wells including supporting production and transportation infrastructure typically consisting of access roads, storage tanks,

flowlines, and gathering lines exist within the authorized boundaries of the 12 parks (table 2). However, specific regulatory provisions in the current 9B regulations grant exemptions to 319 (about 60 percent) of these non-federal oil and gas wells located within the authorized boundaries of the affected parks. Regulatory exemptions can present significant resource protection and human health and safety concerns to the NPS.

TABLE 2. REGULATORY STATUS OF NON-FEDERAL OIL AND GAS WELLS AND NUMBER OF OPERATORS IN NATIONAL PARK SYSTEM UNITS

Park	State	36 CFR 9B Regulatory Status			Total Wells	Total Operators
		Grandfathered Wells	Wells Not Requiring Access Across Federal Lands	Subject to 9B Regulation		
Alibates Flint Quarries National Monument (ALFL)	TX	0	0	5	5	1
Aztec Ruins National Monument (AZRU)	NM	1	0	3	4	2
Big Cypress National Preserve (BICY)	FL	0	0	20	20	1
Big Thicket National Preserve (BITH)	TX	0	2	37	39	16
Big South Fork National River and Recreation Area (BISO)	TN, KY	98	54	0	152	31
Cuyahoga Valley National Park (CUVA)	OH	66	21	3	90	21
Cumberland Gap National Historic Park (CUGA)	KY, TN, VA	2	0	0	2	1
Gauley River National Recreation Area (GARI)	WV	28	0	0	28	3
Lake Meredith National Recreation Area (LAMR)	TX	41	0	133	174	17
New River Gorge National River (NERI)	WV	1	0	0	1	1
Obed Wild and Scenic River (OBED)	TN	4	1	0	5	2
Padre Island National Seashore (PAIS)	TX	0	0	14	14	2
Percent of Total		45%	15%	40%	100%	
12 Parks	8 States	241	78	215	534	98

Section 9.30(a) in the current 9B regulations applies to the conduct of all non-federal oil and gas activities within any unit of the national park system where access is on, across or through federally owned or controlled lands or waters. Therefore, if an operator accesses non-federally owned oil and gas rights inside the boundary of a unit of the national park system without crossing federally owned or controlled lands, the operator’s oil and gas activities are outside the scope of the regulations. As a result, 78 non-federal oil and gas wells (about 15 percent) in parks are currently exempt from the regulatory requirements even though the operations occur inside park boundaries and have the potential to affect

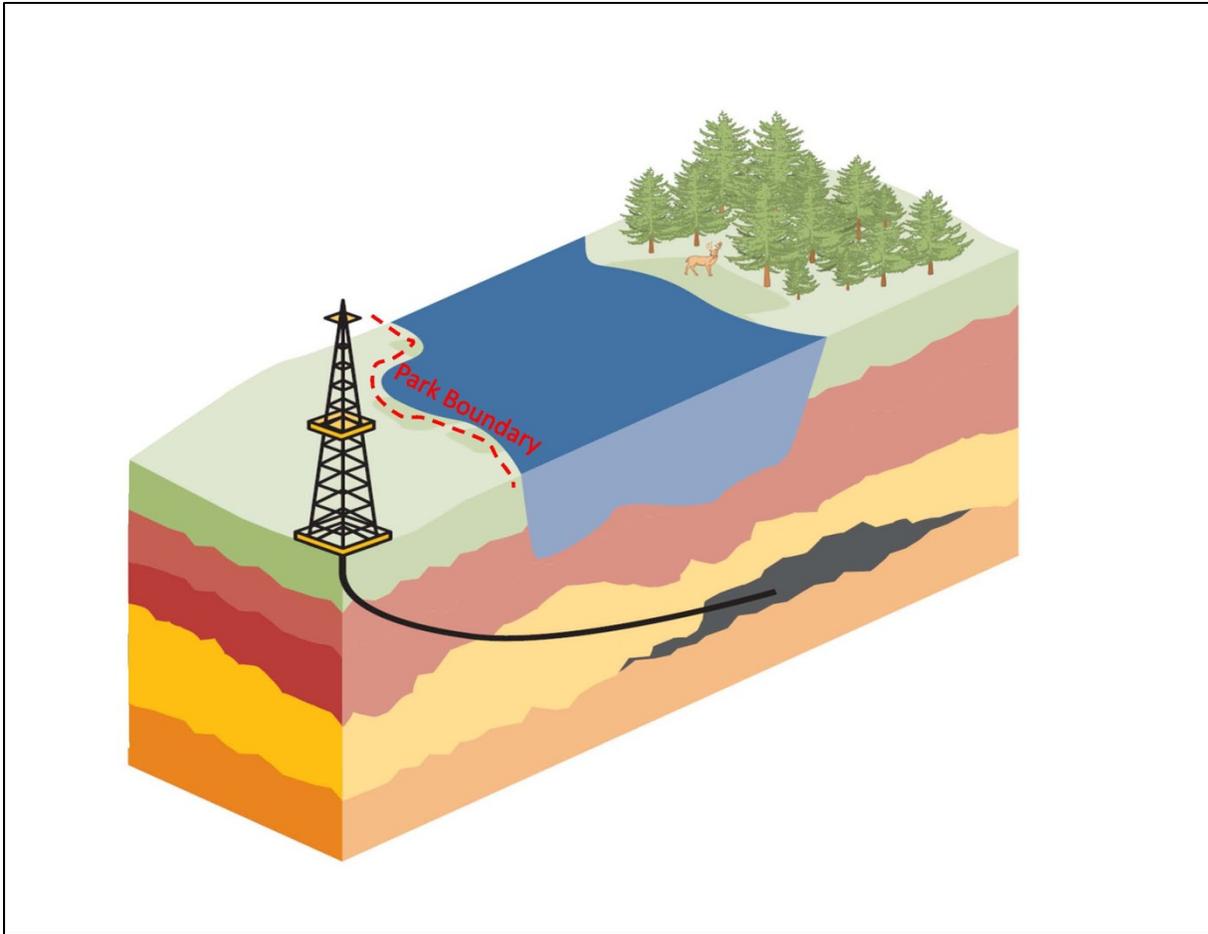
park resources and values. This exemption is not required by any statute but was the result of the NPS exercising its discretion at the time the regulations were promulgated in 1979.

The current regulations at 36 CFR 9.33 (existing operations) apply to operations authorized by a valid federal or state permit and that were operating at the time the regulations became effective (January 8, 1979). Such operations are “grandfathered” and exempt from the plan of operations requirement, but may be suspended if the operations pose an immediate threat of significant injury to federally owned or controlled lands or waters. Section 9.33 provides that upon expiration of a valid state or federal permit the operator must comply with all provisions of the 9B regulations. However, the rate permit expirations has been much slower than anticipated by the drafters of the current 9B regulations, leaving a large number of this class of operations outside the scope of the NPS regulations and therefore not regulated by the NPS. Because of this exemption, about 45 percent (241) of the non-federal oil and wells in parks today are not subject to the plan of operations requirements of the regulations. Like the exemption discussed above in 36 CFR 9.30(a), this exemption is not specified in any statute, but was an exercise of the NPS discretion at the time the regulations were promulgated.

SCOPE OF NPS JURISDICTION ON DIRECTIONAL DRILLING OPERATIONS FROM LANDS OUTSIDE PARKS

Advances in oil and gas directional drilling technologies have resulted in an increase in the number of wells drilled into non-federal mineral estates beneath parks from surface operation locations outside park boundaries. Figure 2 presents a diagram of a directional well drilled beneath a park from a surface location outside the park boundary. A total of 68 wells have been directionally drilled from surface locations outside park boundaries at four parks. NPS statistics indicate that a total of 38 directionally drilled wells are currently active. A provision in 36 CFR 9.32(e) specifies that an operator can be granted an exemption from the plan of operations requirement if the NPS determines that the operation poses no significant threat of damage to park resources resulting from the well bore drilled beneath the park including surface subsidence, fresh water aquifer contamination, or release of natural gas. There are no known instances of impacts to park resources resulting from the 68 well bores drilled and operated beneath parks. However, future case-by-case evaluation is warranted to define the risks of potential impacts and necessary mitigation based on the separation and isolation of downhole activities (e.g., drilling or hydraulic fracturing) to subsurface resources such as freshwater aquifers or cave and karst systems.

It is important to note that the NPS does not exercise jurisdiction on drilling and production operations conducted on lands outside park boundaries including but not limited to access routes, well pad location, drilling and production equipment on the surface, and produced product transportation routes and methods on such external lands. The scope of NPS jurisdiction on directional drilling and production operations conducted from surface locations outside of park boundaries is limited to those aspects of the operations conducted inside the park boundary including but not limited to drilling of the well bore, well casing and cementing procedures and well plugging procedures. However, the current 9B regulations do not fully describe the information required to apply for an exemption to the plan of operations, or clearly describe the NPS criteria for evaluating the exemption application.



Source: EngineerCE.com 2013

FIGURE 2. SCHEMATIC OF A DIRECTIONALLY DRILLED WELL BENEATH A PARK THAT IS DRILLED FROM A SURFACE LOCATION OUTSIDE THE PARK

FINANCIAL ASSURANCE FROM OPERATORS

Under the current 9B regulations, operators conducting non-federal oil and gas operations which are subject to an approved plan of operations must submit a suitable performance bond to the NPS. Requiring a performance bond or other type of financial assurance ensures that adequate funds will be available for the NPS to have a third party carry out the plugging and reclamation requirements in the event an operator becomes insolvent or defaults on his/her obligations under an approved plan of operations. The financial assurance filed with the NPS is in addition to any other financial assurance the operator may have to provide to state or other federal agencies.

With respect to financial assurance, the current regulations establish a maximum overall amount of \$200,000 per operator, with a maximum of \$50,000 per wellsite for liability. These monetary limits on performance bonds or security deposits often times do not reflect reasonable costs of reclaiming geophysical survey operation areas and oil and gas well sites, including typical costs for the proper plugging of abandoned wells and reclamation of well-site access roads, particularly when a single operator has multiple operations in a given park. These outdated limits on performance bond and liability place the NPS and, ultimately, the American taxpayer at financial risk for incurring the cost of proper

reclamation of non-federal oil and gas operation sites in parks or repairing damages to park system resources.

CLARITY OF REGULATIONS AND INCORPORATION OF NEW TECHNOLOGIES

The current 9B regulations specify information that must be included in a proposed plan of operations. Although the current plan of operations information requirements are fairly comprehensive and adequate for the NPS and operators to understand, they do not clearly distinguish information required for various types of oil and gas operations such as geophysical surveys, well drilling, production, and well stimulation operations.

A similar issue also exists with the operating standards specified in the current 9B regulations. Operating standards are written broadly and it may be difficult to distinguish which standards apply to specific types of oil and gas operations. In addition, some operating standards appear indifferent subsections throughout the regulations.

COST RECOVERY AND COMPENSATION

Congress enacted 54 USC 103014, which authorized the NPS to “recover all costs of providing necessary services associated with special use permits. The reimbursements shall be credited to the appropriation current at that time.” Because this authority had not been available to the NPS at the time the current regulations were promulgated, the NPS has not recovered costs from an operator associated with processing permit applications and subsequent monitoring of the operation. The current regulations require non-federal oil and gas operators to pay a registration fee for use of roads administered by the NPS, and operators are liable for all damages to NPS roads, resources or other facilities caused by commercial vehicles used in the conduct of operations in parks. However, the existing regulations do not require operators to pay compensation for use of new roads across federally owned and controlled lands outside the boundary of their mineral right to gain access to their mineral right. An operator’s use of NPS surface estate outside the boundary of its mineral right is a privilege. Private landowners and other federal land managing agencies (e.g., U.S. Bureau of Land Management (BLM) and U.S. Forest Service) obtain compensation for privileged use of federally owned lands.

PRACTICAL MEANS TO DEAL WITH MINOR VIOLATIONS AND UNAUTHORIZED OPERATIONS

The current 9B regulations authorize the NPS to suspend an operation or revoke an operator’s plan approval if an operator damages or threatens damage to federally owned or controlled lands, waters, or resources. However, suspension of an operation or revocation of permit approval are not always effective means of dealing with minor acts of noncompliance.

SCOPING PROCESS AND PUBLIC PARTICIPATION

NEPA requires an “early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action (40 CFR 1501.7).” To determine the scope of issues to be analyzed in depth in this plan, meetings were conducted with park staff, the public, and other parties with an interest in this plan/EIS.

The scoping process for the development of this draft EIS included multiple efforts to involve the public, tribes, and local, state and other federal agencies. All applicable public participation has been documented, analyzed, and is on file with the NPS. Refer to chapter 5 of this document for a more

detailed summary of the public comments received during public scoping. The description below provides a summary of this process.

The scoping process began in July 2009 with the establishment of an interdisciplinary team comprised of NPS subject matter experts, practitioners, and natural and cultural resource management professionals. Public participation in the scoping process officially began through publication of an Advance Notice of Proposed Rulemaking in the Federal Register (74 FR 61596) on November 25, 2009. The NPS also issued an official news release on December 22, 2009, advising the public on publication of the Advance Notice of Proposed Rulemaking in the Federal Register. On December 30, 2010, the NPS again engaged the public in the scoping process to revise the 9B regulations by publishing a Notice of Intent (NOI) to prepare an EIS in the Federal Register (75 FR 82362). The NOI specifically solicited public comment on draft purpose and need statements, objectives, and issues and concerns related to the revision of the NPS regulations governing non-federal oil and gas development on units of the national park system. A summary of the agency and public scoping activities is available in “Chapter 5: Consultation and Coordination.”

IMPACT TOPICS

As a result of this scoping effort, issues related to potential impacts on park resources and values were identified as requiring further analysis in this plan. These represent existing concerns, as well as concerns that might arise during consideration and analysis of alternatives. According to section 2.6 of NPS Director’s Order 12, issues describe the relationship between actions and environmental resources (natural, cultural, and socioeconomic). They are usually problems caused by one of the alternatives considered, but can also include questions, concerns, or other relationships, including those that may be beneficial. Issues were identified by the NPS through internal, public, and agency scoping. Agencies such as the U.S. Environmental Protection Agency (USEPA), as well as tribes, oil and gas operators, and members of the public have provided their input into these issues through the public scoping process.

Per section 2.9 of Director’s Order 12, impact topics are derived from the issues, and should be specific based on the degree to which a resource may be affected (NPS 2011). The impact topics developed from the list of issues are discussed in “Chapter 3: Affected Environment,” of this proposed rule revision/EIS. “Chapter 4: Environmental Consequences,” examines the extent to which the resources associated with each impact topic would be affected by the proposed actions in a particular alternative.

The following issues have been identified for detailed analysis in this plan/EIS:

- **Geology and Soils** (including paleontology)—Oil and gas activities can result in increased surface runoff, soil erosion and compaction, affecting the permeability of soils (and other soil characteristics). Poorly maintained well pads, roads, and other oil and gas operations are currently causing erosion, sedimentation, compaction, and loss of soil productivity. Sensitive geologic features (such as rock shelters, arches, and chimneys) and paleontological resources can also be affected by oil and gas operations that involve ground disturbing activities.

The implementation of revised regulations governing non-federal oil and gas operations could result in beneficial effects to geology, soils, and sensitive geologic features from improved oversight of currently exempt oil and gas operations that occur near sensitive soils and geologic resources.

- **Air Quality**—Because unregulated oil and gas operations can contribute to incremental effects to local and regional air quality, the implementation of revised regulations governing non-federal oil and gas operations would bring previously unregulated operations into compliance, and could result in beneficial effects in regional conformity with the National Ambient Air Quality

Standards (NAAQS) and prevention of significant deterioration (PSD) of air quality in park units with oil and gas operations.

- **Water Resources** (including surface and groundwater and both water quality and quantity)—Oil and gas operations can affect both surface and groundwater quality by the release of hydrocarbons and other contaminating substances and from soil erosion and sedimentation. These operations may also create an increased demand for water use. The implementation of revised regulations governing non-federal oil and gas operations could result in beneficial effects to water resources from improved oversight of operations.
- **Wetlands**—Oil and gas operations may affect wetlands directly through siting of facilities in wetland areas or indirectly through releases of hydrocarbons or other contaminants in wetland areas. The implementation of revised regulations governing non-federal oil and gas operations could result in beneficial effects to wetlands from improved oversight of operations that occur within or near these features.
- **Floodplains**—The siting of oil and gas facilities in floodplains can adversely affect floodplain functions and values and have safety implications if facilities are not adequately designed to withstand flooding. The implementation of revised regulations governing non-federal oil and gas operations could result in beneficial effects to floodplains from improved oversight of operations that occur near these features.
- **Vegetation** (including plant species of special management concern)—Effects on vegetation can occur from site development and from spills and leaks at unregulated oil and gas facilities. The implementation of revised regulations governing non-federal oil and gas operations could result in beneficial effects to vegetation (including plant species of special management concern) with improved oversight and enforcement of violations.
- **Wildlife and Aquatic Species** (including animal species of special management concern)—Effects on wildlife and aquatic species can occur from site development and from spills and leaks at unregulated oil and gas facilities. The implementation of revised regulations governing non-federal oil and gas operations could result in beneficial effects to wildlife and aquatic species with improved oversight and enforcement of violations.
- **Visitor Use and Experience** (including human health and safety, visitation patterns, visitor activities, recreation, interpretation)—Revisions to the regulations governing non-federal oil and gas operations could result in beneficial changes to operations that currently pose a threat to human health and safety from a number of sources, including the use of roads by commercial vehicles (particularly vehicles with less maneuverability and visibility); hazardous equipment at wells and production facilities; flowline or pipeline failure; and release of gases from wells (hydrogen sulfide). In addition, instances have been documented of valves on gas wells being opened to use the gas as a source of heat. The spill or release of hydrocarbons or other contaminants could be inhaled, absorbed, or ingested by humans.
- **Scenic Views and Night Sky Resources**—Visual resources are impacted by oil and gas operations, which create a visual effect on the landscape and affect scenic viewsheds. Implementation of revised regulations governing non-federal oil and gas operations would require operators to demonstrate the ability to pay reclamation costs, could result in beneficial effects to visual quality as operations are brought into compliance with the new rules.

Impacts on night skies from the effects of artificial lighting near oil and gas operations occurring during exploration and drilling phases of oil and gas operations, cannot be addressed for exempt operations under the current rule. Implementation of revised regulations governing non-federal oil and gas operations, which would require operators on NPS lands to mitigate impacts on sensitive

park resources, could result in beneficial effects to night skies as operations are brought into compliance with the new rules.

- **Natural Soundscapes and Acoustic Environment**—Human-caused sound from oil and gas operations can adversely affect natural soundscapes in the parks. Effects to natural soundscapes, cultural soundscapes, and the overall acoustic environment from noise generated from oil and gas operations could be influenced by the implementation of revised regulations governing non-federal oil and gas operations. The revised rule could result in beneficial changes to the frequency and intensity of human-caused sound from activities associated with oil and gas development such as well drilling, compressor stations, well servicing, pump jacks, construction and earth-moving activities, and truck traffic.
- **Cultural Resources** (including archeological sites, prehistoric/historic structures, cultural landscapes, ethnographic resources)—Oil and gas operations can directly impact cultural resources through ground disturbance or leaks and spills or indirectly cause damage by increasing access or introducing noise, visual intrusions, or possibly noise or odors into the cultural landscape. The implementation of revised regulations governing non-federal oil and gas operations could result in beneficial effects to cultural resources resulting from improved oversight of operations that occur near cultural resources.
- **Park Management and Operations**—NPS park staff currently enforce the 9B regulations as a routine procedure in park units where there are oil and gas operations. Revised regulations could affect park operations and management as park staff adapt to the new regulations and begin to implement and enforce them.
- **Socioeconomics** (including non-federal oil and gas exploration and development, and regional and local economies)—The implementation of revised regulations governing non-federal oil and gas operations could result in the removal of impedances to cost recovery and compensation from abandoned operations, and a higher potential financial burden to operators and impacts to local economies. Potential impacts of regulations are analyzed in regard to oil and gas well operators, and local and regional economies.

Non-federal oil and gas exploration and development is currently subject to existing 9B regulations, except in cases where operations have been exempted from these regulations. Implementation of 9B rule changes could affect oil and gas exploration and development at park units as previously exempt operations are brought into compliance with the revised regulations.

ISSUES AND IMPACT TOPICS CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

- **Utilities**—Impacts on utilities, such as electrical transmission lines and pipelines are not addressed in this programmatic EIS. The Federal Energy Regulatory Commission (FERC) and U.S. Department of Transportation (DOT) have jurisdiction over transpark pipelines. The NPS currently regulates gathering lines under the 9B regulations. However, the proposed rule requires the operator to provide every aspect of design and construction. If pipelines include ancillary facilities inside a park boundary, such as compressor stations or pumping stations, air pollution controls would be considered against a technologically feasible, least damaging standard.
- **Unique Ecosystems, Biosphere Reserves, and World Heritage Sites**—The park units considered in this programmatic EIS protect unique ecosystems (including free-flowing rivers) that support habitat for many species of management concern. Impacts on these ecosystems would be discussed and analyzed as part of impacts on species of management concern or their habitats. The alternatives considered represent variations in the proposed revisions to existing

regulatory provisions, ensuring adequate protection to resources. As such, regulatory actions proposed do not have the potential to affect unique ecosystems, biosphere reserves, and world heritage sites, and the issues related to natural resources and visitor use and experience described above capture any potential impacts on these resources, which are evaluated in “Chapter 4: Environmental Consequences.”

- **Environmental Justice**—Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. Guidelines for implementing this executive order under NEPA are provided by the Council on Environmental Quality (CEQ) (CEQ 1997).

According to the USEPA, environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. The goal of this “fair treatment” is not to shift risks among populations, but to identify potentially disproportionately high and adverse effects and identify alternatives that may mitigate these impacts (USEPA 1998).

Evaluating whether a proposed action has the potential to have disproportionately high and adverse impacts on minority and/or low income populations typically involves the following: (1) identifying any potential high and adverse environmental or human health impacts; (2) identifying any minority or low income communities within the potential high and adverse impact areas; and (3) examining the spatial distribution of any minority or low income communities to determine if they would be disproportionately affected by these impacts.

The NPS does not anticipate that any effects from the proposed rule changes would result in disproportionately high or adverse impacts on low-income populations or communities. Moreover, additional analysis would be conducted under the revised rule during NEPA analyses of any plans of operation associated with oil and gas activities in order to assess any potential impacts. Therefore, environmental justice was eliminated as an impact topic in this EIS.

- **Wilderness**—In accordance with NPS *Management Policies 2006* section 6.2.1 (NPS 2006), the NPS conducts wilderness eligibility assessments using the NPS’ governing criteria of eligibility to determine which areas, if any, meet the criteria for designation as wilderness. Based on the findings of the assessments, the NPS makes a determination whether lands contained within park units warrant further study for possible inclusion in the national wilderness preservation system. The alternatives considered in this EIS represent variations in the proposed revisions to existing regulatory provisions, ensuring adequate protection to resources. As such, regulatory actions proposed do not have the potential to affect wilderness designations. Issues related to natural resources and visitor use and experience capture any potential impacts on these resources, which are evaluated in “Chapter 4: Environmental Consequences.”
- **Climate Change**—Global climate change refers to a suite of changes occurring in the earth’s atmospheric, hydrologic, biologic, and oceanic systems. These changes, including increased global air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level, provide unequivocal evidence that the global climate system is warming (IPCC 2007).

Although the Intergovernmental Panel on Climate Change affirms that climate change is occurring, the rate and severity of impacts at the park units are unknown. A disrupted climate could affect natural and cultural resources, and would likely interfere with public use and enjoyment of the park units. Although many places in the world have already observed and recorded changes that can be attributed to climate change, the impacts on individual park units have not been specifically determined and the actual implications within the lifespan of this plan are unknown.

This plan evaluates climate change in two ways. First, the effects of climate change on park resources are considered and are addressed in “Chapter 3: Affected Environment.” Climate change can affect park resources, especially vegetation, wildlife and wildlife habitat (including special-status species), and water resources, and this effect is discussed in the introduction to chapter 3. Second, the NPS has considered the contribution of the proposed rule changes to greenhouse gases emissions and potential related impacts on climate change. Because the proposed rule changes will bring operations that are currently exempt from existing regulatory standards into compliance, the resulting net impact on greenhouse gas emissions would be beneficial when compared to the baseline under alternative A. Overall incremental contributions to greenhouse gas emissions from operations located on NPS lands are relatively low. In addition, permitting requirements implemented under new state greenhouse gas emissions regulations which are currently being promulgated by several states will have the effect of mitigating these emissions, thereby lowering overall contributions. These greenhouse gas permitting actions are discussed under cumulative impacts in the analysis. Because the proposed action would have negligible adverse or beneficial impacts related to greenhouse gas contribution and associated climate change, that aspect of climate change was dismissed from further evaluation.

- **Adjacent Land Uses and Resources**—Potential impacts on lands adjacent to park units following implementation of revised regulations governing non-federal oil and gas operations are addressed under each impact topic in this EIS as part of the discussion of directional drilling. Additionally, NPS resources may be adversely affected by the intensity of development on adjacent lands. The influence of oil and gas development on adjacent lands and, in particular, the use of directional drilling techniques for recovering oil and gas reserves on adjacent lands, has the potential to result in adverse impacts on NPS resources. NPS resources may also be affected through the removal of the federal access requirement now in place, thereby removing the incentive for oil and gas operations to locate outside of park units. This incentive is described in greater detail in “Chapter 4: Environmental Consequences.” Impacts on park resources and adjacent lands stemming from these scenarios are described for each resource topic in this EIS.
- **Indian Trust Resources and Sacred Sites**—Indian trust assets are owned by Native Americans but held in trust by the United States. The U.S. Department of the Interior (DOI) requires that any anticipated impacts to Indian trust resources due to a proposed project or action by Interior agencies be explicitly addressed in environmental documents (512 Departmental Manual 2). NPS does not anticipate impacts to Indian trust resources by this action because the proposed action does not authorize site specific or on the ground impacts. Additionally, through tribal consultation NPS did not identify trust assets that could be affected.

FEDERAL LAWS, POLICIES, AND REGULATIONS DIRECTLY RELATED TO NON-FEDERAL OIL AND GAS DEVELOPMENT IN UNITS OF THE NATIONAL PARK SYSTEM

Table 3, summarizes the NPS legal and policy mandates that govern non-federal oil and gas operations in units of the national park system. The legal and policy mandates include statutes, regulations, executive

orders, and NPS policies. Summary descriptions of many of the legal and policy requirements are provided in table 3.

TABLE 3. NATIONAL PARK SERVICE LEGAL AND POLICY MANDATES GOVERNING NON-FEDERAL OIL AND GAS OPERATIONS

Authorities	Resources and Values Afforded Protection
National Park Service Laws and Applicable Regulations	
NPS Organic Act of 1916, as amended, 54 USC 100101 et seq.	All resources, including air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, threatened and endangered species, visitor use and experience, and visual resources.
National Park System General Authorities Act, 54 USC 100752 et seq.	All resources, including air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, threatened and endangered species, visitor use and experience, and visual resources.
Park-specific enabling legislation that grants the NPS the authority to promulgate regulations regarding the exercise of non-federal oil and gas rights within that unit.	All resources, including air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, threatened and endangered species, visitor use and experience, and visual resources.
NPS Omnibus Management Act of 1998, 54 USC 100701 et seq.	Any living or nonliving resource.
NPS Non-Federal Oil and Gas Regulations – 36 CFR 9B	Air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, threatened and endangered species, and visitor use and experience.
Park System Resource Protection Act (PSRPA), 54 USC 100721	Any living or nonliving resource that is located within the boundaries of a unit of the national park system, except for resources owned by a non-federal entity.
Alaska National Interest Lands Conservation Act, 16 USC 3101 et seq.	Provides for over 100 million acres of public lands, fully a third of which was set aside as wilderness areas. Lands claimed by Alaska Natives under the Alaska Native Claims Settlement Act are officially recognized. Existing timber contracts are to be filled with timber from other national forest lands.
National Park Service Policies, Guidelines, and Procedures	
NPS <i>Management Policies 2006</i> (NPS 2006)	All resources, including air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, threatened and endangered species, visitor use and experience, and visual resources.
NPS Director’s Order 12 and Handbook, Conservation Planning, Environmental Impact Analysis, and Decision Making (NPS 2005, 2011)	All resources, including natural resources, cultural resources, human health and safety, socioeconomic environment, and visitor use.
NPS Director’s Order 28, Cultural Resource Management (NPS 1998)	Cultural, historic, and ethnographic resources.
NPS Director’s Order and Reference Manual 53, Special Park Uses (NPS 2010)	All resources, including air resources, cultural and historic resources, natural resources, biological diversity, human health and safety, threatened and endangered species, visitor use and experience, and visual resources.
NPS Director’s Order 47, Soundscape Preservation and Noise Management	The purpose of this Director’s Order is to articulate NPS operational policies that will require, to the fullest extent practicable, the protection, maintenance, or restoration of

Authorities	Resources and Values Afforded Protection
	the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources.
NPS 66, Minerals Management Guideline (NPS 1990)	Natural resources, human health and safety.
NPS Reference Manual 77, Natural Resources Management (NPS 1991)	Natural resources.
NPS Director's Order and Procedural Manual 77-1, Wetland Protection (NPS 2002a)	Wetlands.
NPS Director's Order and Procedural Manual 77-2, Floodplain Management (NPS 2003)	Floodplains.

NPS ORGANIC ACT

The Organic Act and its amendments afford the NPS latitude when making resource decisions. Because conservation remains predominant, the NPS seeks to avoid or to minimize adverse impacts on park resources and values. While some actions and activities can cause impacts, the Organic Act prohibits actions that impair park resources unless a law directly and specifically allows for such actions (54 USC 100101). An action constitutes an impairment when its effects “harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values” (NPS 2006, section 1.4.4). To determine impairment, the NPS must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts” (NPS 2006, section 1.4.4; see the “Impairment of National Park Resources” section below).

Because park units vary based on enabling legislation, natural resources, cultural resources, and missions, management activities appropriate for each unit and for areas within each unit vary as well. An action appropriate in one unit could impair resources in another unit. Thus, this proposed rule revision/EIS will analyze the context, duration, and intensity of impacts related to oil and gas operations within the aforementioned 42 category 1 and 2 park units, which will inform the nonimpairment determination for the selected alternative to be appended to the record of decision (ROD), pursuant to the NPS Guidance for Non-Impairment Determinations and the NPS NEPA process.

Nonimpairment of National Park Resources

In addition to determining the environmental consequences of implementing the preferred and other alternatives, NPS *Management Policies 2006* (section 1.4) requires analysis of management actions to determine whether or not proposed actions would impair a park’s resources and values.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS the management discretion to allow impacts on park resources and values when necessary and appropriate in parks where oil and gas is explicitly mentioned its enabling legislation. That discretion is limited by the statutory requirement that the NPS must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

An impact on any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan (GMP) or other relevant NPS planning documents as being of significance.

An impact would be less likely to constitute an impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated.

Impairment may result from visitor activities, NPS administrative activities, or activities undertaken by concessioners, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park.

Impairment findings are not necessary for visitor experience, socioeconomics, public health and safety, environmental justice, land use, and park operations because impairment findings relate back to park resources and values. Pursuant to the NPS Guidance for Non-Impairment Determinations and the NPS NEPA process, a nonimpairment determination for the selected alternative will be appended to the ROD.

NPS MANAGEMENT POLICIES 2006

The *NPS Management Policies 2006* (NPS 2006) provide the overall foundation, set the framework, and provide direction for management decisions within the NPS. Management policies cover park system planning, land protection, natural resource management, cultural resource management, wilderness preservation and management, interpretation and education, use of the parks, park facilities, and commercial visitor services. The policies guide NPS staff to manage national park system units consistently and professionally to achieve the Congressional mandate of the national park system (NPS 2006). Adherence to NPS policy is mandatory, unless specifically waived or modified by the Secretary of the Interior, the Assistant Secretary of the Interior, or the Director of the NPS.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969, AS AMENDED

NEPA section 102(2)(c) requires that an EIS be prepared for proposed major federal actions that may significantly affect the quality of the human environment.

DIRECTOR'S ORDER 12: CONSERVATION, PLANNING, ENVIRONMENTAL IMPACT ANALYSIS, AND DECISION-MAKING

NPS Director's Order 12 (NPS 2011) and its accompanying handbook (NPS 2005) lay the groundwork for how the NPS complies with NEPA. Director's Order 12 and the handbook set forth a planning process for incorporating scientific and technical information and for establishing an administrative record for NPS projects.

NPS Director's Order 12 follows the CEQ regulations and requires that impacts on park resources be analyzed in terms of their context, duration, and intensity. It is crucial for the public and decision-makers to understand the implications of those impacts in the short- and long-term, cumulatively, and within context, based on an understanding and interpretation by resource professionals and specialists.

GLOBAL WARMING EXECUTIVE ORDER AND POLICIES

DOI Secretarial Order 3226—Issued on January 19, 2001, the order ensures that climate change impacts are taken into account in connection with DOI planning and decision making.

DOI Secretarial Order 3289—On September 14, 2009, Secretary of the Interior Ken Salazar signed Secretarial Order 3289, which establishes as priorities the development of environmentally responsible renewable energy on our nation’s public lands, and the protection of “our country’s water, land, fish and wildlife, and cultural heritage and tribal lands and resources from the dramatic effects of climate change that are already occurring – from the Arctic to the Everglades.” In addition, the secretarial order establishes a framework through which DOI bureaus will coordinate climate change science and resource management strategies to address climate change. The newly established framework consists of a Climate Change Response Council to coordinate DOI’s response to the impacts of climate change; eight DOI regional Climate Change Response Centers to synthesize climate change impact data; and a network of Landscape Conservation Cooperatives to engage DOI and federal agencies, local and state partners, and the public to craft practical, landscape-level strategies for managing climate change impacts within the eight regions.

NPS Management Policies 2006—Section 9.1.7 requires the NPS to interpret for the public the overall resource protection benefits from the efficient use of energy, and to actively educate and motivate park personnel and visitors to use sustainable practices in conserving energy.

STATUTORY PROVISIONS FOR RECOVERY OF DAMAGES

The NPS is responsible under the 1916 NPS Organic Act and a variety of other statutes (refer to NPS *Management Policies 2006*) for the management, protection, and conservation of park resources and values in a manner that will leave them unimpaired for the enjoyment of future generations. Among these statutes, there are four that specifically allow the NPS to recover civil damages and agency costs from any person who destroys, causes the loss of, or injures any park system resource: (1) the Comprehensive Environmental Response, Compensation and Liability Act as amended, 42 USC 9601 et seq.; (2) the Oil Pollution Act, 33 USC 2701-2761; (3) the Federal Water Pollution Control Act or Clean Water Act, 32 USC 1251-1387; and (4) the PSRPA, 54 USC 100721. The damages recovered are then used to restore, replace, or acquire the equivalent of the resources that were lost or injured.

The NPS authority under these four statutes is derived from the delegated authority of the Secretary of the Interior. The first three statutes authorize the NPS to act as trustee for natural resources injured as a result of releases of hazardous substances or discharges, or threats of discharge of oil affecting the national park system. The Secretary’s authority as trustee under these three statutes covers natural resources and natural resource services belonging to, managed by, held in trust by, appertaining to, or otherwise controlled by the DOI. This authority may be a shared authority. Trusteeship for some resources may overlap with other DOI bureaus, other federal agencies, and states or federally recognized tribes. It is the policy of the DOI to exercise, as appropriate, its natural resource trusteeship to the fullest extent authorized by law and seek recovery of damages for injury to trust resources in order to accomplish restoration of the resource.

The fourth statute (PSRPA) provides the NPS its own separate authority to collect damages for injury to park resources, which is not restricted to injury to natural resources caused by oil spills or hazardous substance releases. It allows the NPS to seek recovery of damages for injury to any park system resource resulting from any incident caused by a person or instrumentality. PSRPA imposes strict liability (i.e., without fault) on individuals who cause injury to park system resources, and allows the NPS to recover and retain compensation through settlements and/or litigation to protect and restore injured park system resources. In addition, this law allows the NPS to recover its costs for actions taken in responding to

incidents that cause injury to park system resources, and actions taken to abate or minimize the imminent risk of injury to park system resources caused by the incident.

OTHER APPLICABLE FEDERAL LAWS, POLICIES, AND REGULATIONS

In addition to the NPS legal and policy mandates that govern non-federal oil and gas operations in the units of the national park system, other federal laws, regulations, executive orders, policies, guidelines, and procedures also apply to the conduct of such operations in parks. Many of these additional legal and policy mandates are presented in table 4.

TABLE 4. OTHER FEDERAL LEGAL AND POLICY MANDATES GOVERNING NON-FEDERAL OIL AND GAS OPERATIONS IN NATIONAL PARK SYSTEM UNITS

Authorities	Resources and Values Afforded Protection
Other Applicable Federal Laws and Regulations	
American Indian Religious Freedom Act, as amended, 42 USC 1996 – 1996a; 43 CFR Part 7	Cultural and historic resources.
Antiquities Act of 1906, 54 USC 320301 – 320303; 43 CFR Part 3	Cultural, historic, archeological, and paleontological resources.
Archaeological Resources Protection Act of 1979, 16 USC 470aa – 470mm; 18 CFR Part 1312; 32 CFR Part 229; 36 CFR Part 296; 43 CFR Part 7	Archeological resources.
Clean Air Act, as amended, 42 USC 7401 – 7671q; 40 CFR Parts 23, 50, 51, 52, 58, 60, 61, 82, and 93; 48 CFR Part 23	Air resources.
Coastal Zone Management Act of 1972, 16 USC 1451 et seq.; 15 CFR Parts 923, 930, 933	Coastal waters and adjacent shoreline areas.
Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 USC 9601 – 9675; 40 CFR Parts 279, 300, 302, 355, and 373	Human health and welfare and the environment.
Endangered Species Act of 1973, as amended, 16 USC 1531 – 1544; 36 CFR Part 13; 50 CFR Parts 10, 17, 23, 81, 217, 222, 225, 402, and 450	Plant and animal species or subspecies (and their habitat), which have been listed as threatened or endangered by the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service.
Federal Insecticide, Fungicide, and Rodenticide Act, as amended (commonly referred to as Federal Environmental Pesticide Control Act of 1972), 7 USC 136 et seq.; 40 CFR Parts 152 – 180, except Part 157	Human health and safety and the environment.
Federal Land Policy and Management Act of 1976, 43 USC 1701 et seq.; 43 CFR Part 2200 for land exchanges and 43 CFR Parts 1700 – 9000 for all other BLM activities	Federal lands and resources administered by the BLM.
Federal Water Pollution Control Act of 1972 (commonly referred to as Clean Water Act), 33 USC 1251 et seq.; 33 CFR Parts 320 – 330; 40 CFR Parts 110, 112, 116, 117, 230 – 232, 323, and 328	Water resources, wetlands, and waters of the United States.
Historic Sites, Buildings, and Antiquities Act (Historic Sites Act of 1935), 54 USC 320101 – 320106; 18 CFR Part 6; 36 CFR Parts 1, 62, 63, and 65	Historic sites, buildings and objects.

Other Applicable Federal Laws, Policies, and Regulations

Authorities	Resources and Values Afforded Protection
Lacey Act, as amended, 16 USC 3371 et seq.; 15 CFR Parts 10, 11, 12, 14, 300, and 904	Fish and wildlife, vegetation.
Migratory Bird Treaty Act, as amended, 16 USC 703 – 712; 50 CFR Parts 10, 12, 20, and 21	Migratory birds.
National Environmental Policy Act of 1969, 42 USC 4321 et seq.; 40 CFR Parts 1500 – 1508	The human environment (e.g., cultural and historic resources, natural resources, biodiversity, human health and safety, socioeconomic environment, visitor use and experience). Human environment is the natural and physical environment and the relationship of the people with that environment (CEQ 2007).
National Historic Preservation Act of 1966, as amended, 54 USC 300101 – 300321; 36 CFR Parts 60, 63, 78, 79, 800, 801, and 810	Cultural and historic properties listed in or determined to be eligible for listing in the National Register of Historic Places (National Register).
Native American Graves Protection and Repatriation Act, 25 USC 3001 – 3013; 43 CFR Part 10	Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony.
Noise Control Act of 1972, 42 USC 4901 – 4918; 40 CFR Part 211	Human health and welfare.
Oil Pollution Act, 33 USC 2701 – 2761; 15 CFR Part 990; 33 CFR Parts 135, 137, and 150; 40 CFR Part 112; 49 CFR Part 106	Water resources, natural resources.
Paleontological Resources Protection Act, 16 USC 470aaa – 470aaa-11	Paleontological resources.
Pipeline Safety Act of 1992, 49 USC 60101 et seq.; 49 CFR Subtitle B, Chapter 1, Parts 190 – 199	Human health and safety, and the environment.
Resource Conservation and Recovery Act, 42 USC 6901 et seq.; 40 CFR Parts 240 – 280; 49 CFR Parts 171 – 179	Natural resources, human health and safety.
Rivers and Harbors Act of 1899, as amended, 33 USC 401 et seq.; 33 CFR Parts 114, 115, 116, 321, 322, and 333	Shorelines and navigable waterways, tidal waters, wetlands.
Safe Drinking Water Act of 1974, 42 USC 300f et seq.; 40 CFR Parts 141 – 148	Human health, water resources.
Wilderness Act, 16 USC 1131 et seq.	All natural resources located in the area designated by Congress as Wilderness or Potential Wilderness.
Wild and Scenic Rivers Act, 16 USC 1271 et seq.	Designated rivers and their immediate environments.
Executive Orders	
Executive Order 11593 – Protection and Enhancement of the Cultural Environment, 36 Fed. Reg. 8921 (1971)	Cultural resources.
Executive Order 11988 – Floodplain Management, 42 Fed. Reg. 26951 (1977)	Floodplains; human health, safety, and welfare.
Executive Order 11990 – Protection of Wetlands, 42 Fed. Reg. 26961 (1977)	Wetlands.
Executive Order 12088 – Federal Compliance with Pollution Control Standards, 43 Fed. Reg. 47707 (1978)	Natural resources, human health and safety.
Executive Order 12630 – Governmental Actions and Interference with Constitutionally Protected Property Rights, 53 Fed. Reg. 8859 (1988)	Private property rights, public funds.

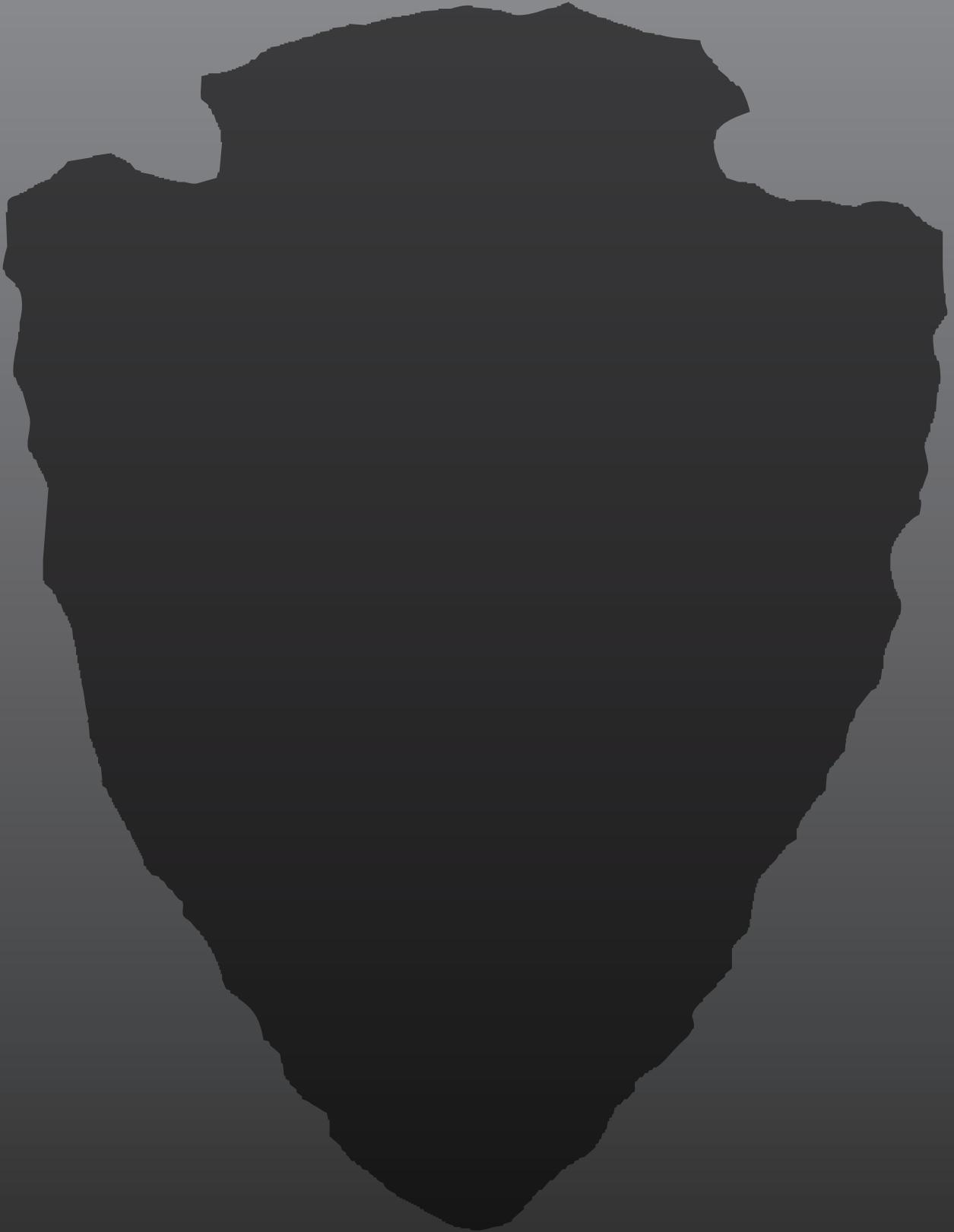
Authorities	Resources and Values Afforded Protection
Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, amended by Exec. Order No. 12948, 60 Fed. Reg. 6379 (1995)	Human health and safety; minority populations and low-income populations.
Executive Order 13007 – Indian Sacred Sites, 61 Fed. Reg. 26771 (1996)	Native American sacred sites.
Executive Order 13112 – Invasive Species, 64 Fed. Reg. 6183 (1999)	Vegetation and wildlife.
Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds, 66 Fed. Reg. 3853 (2001)	Migratory birds.
Executive Order 13212 – Actions to Expedite Energy-Related Projects, 66 Fed. Reg. 28357 (2001)	Production, transmission, and conservation of energy.
Policies, Guidelines and Procedures	
Department of the Interior, Implementation of the National Environmental Policy Act – 43 CFR 46 (2008)	All resources including cultural resources, historic resources, natural resources, human health and safety.
Department of the Interior, Departmental Manual, DM 517 –Pesticides (DOI 1981)	Human health and safety, and the environment.
Department of the Interior, Departmental Manual, DM 519 – Protection of the Cultural Environment (DOI 1994)	Archeological, prehistoric resources, historic resources, Native American human remains, and cultural objects.
Department of the Interior, Onshore Oil and Gas Order Number 2, Section III, Drilling Abandonment Requirements, 53 Fed. Reg. 46,810 – 46,811 (DOI 1988)	Human health and safety.
Secretary of the Interior’s Standards and Guidelines for Archeology and Historic Preservation, 48 Fed. Reg. 44716 (DOI 1983), also published as Appendix C of NPS Director’s Order 28 – Cultural Resource Management	Cultural and historic resources.
Government-to-Government Relations with Native American Tribal Governments, Presidential Memorandum (Clinton 1994)	Native Americans – Tribal rights and interests.

RELATIONSHIP TO STATE LAWS, REGULATIONS, AND POLICIES

Operators conducting non-federal oil and gas operations in national park system units must comply with the 9B regulations and all applicable federal laws, regulations, and policies, as well as all applicable state laws, regulations, and policies. In general, the 9B regulations focus on surface protection in parks by requiring operators to use oil and gas development methods that will avoid or minimize adverse impacts on park resources, values, and human health and safety. State laws, regulations and policies typically focus on conservation of the oil and gas resource through the application of well spacing and density rules, and protection of the associated ownership interests. In addition, state oil and gas development rules often address protection of groundwater and surface water through the application of well drilling, cementing, completion and plugging requirements; protection of wildlife potentially exposed to open-top oil storage tanks or various types of earthen pits; oil spill cleanup and remediation requirements for soils; and public and worker safety requirements. Because state oil and gas regulatory agencies and the NPS have fundamentally different legal and policy mandates and objectives, the NPS requirements pertaining

to non-federal oil and gas development in parks often go beyond those requirements that a private mineral developer would expect if solely subject to state rules.

Chapter 2 Alternatives



CHAPTER 2: ALTERNATIVES

INTRODUCTION

This chapter describes the alternatives under consideration for proposed revisions to existing regulations governing the exercise of non-federal oil and gas rights within the boundaries of units of the national park system, known as the “9B regulations.” The National Environmental Policy Act (NEPA) requires federal agencies to explore a range of reasonable alternatives and to analyze what impacts the alternatives could have on the human environment, which the act defines as “the natural and physical environment and the relationship of people with that environment.” The existing conditions are described in “Chapter 3: Affected Environment.” The analysis of impacts is presented in “Chapter 4: Environmental Consequences,” and is summarized in table 7 in this chapter.

The alternatives under consideration must include a “no-action” alternative, as prescribed by NEPA regulations at 40 CFR 1502.14. The no-action alternative in this document is the continuation of the current 9B regulations and the practices associated with implementing those regulations. The proposed changes to the regulations are presented as two action alternatives, which were developed by the National Park Service (NPS), taking into consideration comments obtained from the public and other entities during the planning process. These alternatives meet, to a large degree, the objectives developed for this effort, as well as the purpose of and need for action (refer to “Chapter 1: Purpose of and Need for Action”). Because these action alternatives would be technically and economically feasible, and demonstrate rational thought processes, they are considered “reasonable.” Upon conclusion of the environmental impact statement (EIS) and decision-making process, one of the alternatives will be adopted as the NPS non-federal oil and gas regulations and govern non-federal oil and gas development in national park system units for the foreseeable future. If an action alternative is selected, the NPS will issue a final rule.

This EIS is mostly programmatic in nature, which means that the regulations provide a framework for taking a range of actions and set forth requirements for the implementation of the actions. For some parks that have exempt operations under the current regulations, site-specific information is presented and analyzed. The NPS can authorize specific projects for new oil and gas developments by reviewing and considering for approval operator-submitted permit applications. Before any oil and gas operation is approved under the new regulations, the NPS will conduct further analysis in accordance with NEPA, the National Historic Preservation Act of 1966 (NHPA), the Endangered Species Act of 1973 (ESA), and other federal laws, as applicable.

The no-action and action alternatives selected for detailed analysis are briefly described below, with emphasis on the major changes that would be made to the regulations. This is followed by a summary table (table 5) of the substantive changes that would result from specific components of the proposed alternatives under the rule change. The remainder of this chapter describes how the alternatives meet project objectives, addresses NEPA consistency and presents additional alternatives that were considered but eliminated from detailed analysis. Finally, the agency’s preferred alternative and the environmentally preferable alternative are identified.

OVERVIEW OF ALTERNATIVES

ALTERNATIVE A: NO ACTION

The no-action alternative is the continuation of the 9B regulations as they currently govern the exercise of non-federal oil and gas rights located within units of the national park system. A copy of these regulations is provided in appendix B. The discussion below focuses on those existing 9B provisions that the NPS is proposing to change, either in substance or in format, through this rulemaking.

Purpose and Scope

Existing 36 CFR 9.30(a) triggers application of the 9B regulations only when an operator's "access is on, across or through federally owned or controlled lands or waters." As a result of this provision, a total of 78 operations that do not require access on, across, or through federally owned or controlled lands or waters are exempt from the 9B regulations.

Existing 36 CFR 9.30 (b) and (c) contain guidance that summarizes application of other NPS and U.S. Bureau of Land Management (BLM) regulations to the exercise of other mining and minerals rights that are not governed by 9B regulations, and the design of an operator's permit application, respectively.

Definitions

The existing regulation at 36 CFR 9.31 contains definitions for common terms used in the 9B regulations.

Accessing Oil and Gas Rights Inside a Park Boundary from a Surface Location Outside the Park Boundary

Under existing 36 CFR 9.32(e) operators may apply for an exemption from the regulations if they use directional drilling techniques from a surface location outside a unit of the national park system to reach the bottom hole location of their non-federal oil and gas rights located within NPS boundaries. This exemption is available to an operator if "the Regional Director is able to determine from available data, that such operations pose no significant threat of damage to NPS resources, both surface and subsurface, resulting from surface subsidence, fracture of geological formations with resultant fresh water aquifer [sic] contamination, or natural gas escape, or the like." Surface activities located outside the NPS boundary associated with directional drilling operations developing oil and gas rights inside the NPS boundary are not within the scope of the existing regulation at 36 CFR 9.32(e). Therefore, under the existing regulation the NPS jurisdiction over these operations begins at the subsurface point where the operation (borehole) crosses the boundary of a unit of the national park system and covers all subsequent activities within the unit.

Existing Operations

Under existing 36 CFR 9.33, operators who are conducting operations at the time the regulations became effective (January 8, 1979) and who had already obtained a valid federal or state permit are "grandfathered." Operators who qualify for this exemption are neither required to obtain an approved plan of operations, comply with NPS operating standards, including standards governing reclamation of their area of operations, nor post a reclamation bond. Under 36 CFR 9.33(a)(2) when the existing federal or state permit expires and the operator is issued a new permit, the operator then becomes subject to all provisions of the 9B regulations. As a result of this grandfather provision, 241 operations are exempt from the 9B regulations. The superintendent also has authority under 36 CFR 9.33(c) to suspend

grandfathered operations if there is an “immediate threat of significant injury to federally owned or controlled lands or waters.”

Transfer of Interest

Under the existing regulation at 36 CFR 9.34, a previous operator remains liable on its financial assurance until it notifies the NPS that the rights have been transferred to another party. A new operator cannot operate until it posts financial assurance and ratifies the existing plan of operations. Therefore, a gap exists under the existing regulation. A prior operator that provides notice to the superintendent could request release of its financial assurance before the new operator posts its own financial assurance. If the new owner fails to post financial assurance, the burden of reclaiming the site could fall on the taxpayer.

Information Requirements

Existing 36 CFR 9.36 contains information requirements for an operator to submit a complete plan of operations. Some of these information requirements are described broadly. To help clarify some of the information requirements at existing 36 CFR 9.36, the NPS included guidance in the 2006 Operators Handbook for Nonfederal Oil and Gas Development in Units of the National Park System (NPS Operators Handbook) that more clearly describes some of the information requirements in the regulations. This section allows the operator to cross-reference information contained in a prior approved plan in its proposed plan of operations. Additionally, this section provides that information and materials submitted in compliance with this section does not constitute a plan of operations until the superintendent determines that all necessary information has been submitted and is adequate.

Permit Approval Standards

Under existing 9B regulations at 36 CFR 9.37(a)(1), to approve a plan of operations, the Regional Director must determine that, in all cases, the operator uses technologically feasible methods that are least damaging to federally owned or administered lands, waters, or resources of park units, NPS visitor uses or experiences, or visitor or employee health or safety.

The existing rule has dual approval standards depending on whether the surface interest upon which the operation is located is held by a non-federal entity, 36 CFR 9.37(a)(2), or held by the United States, 36 CFR 9.37(a)(3).

Under existing 36 CFR 9.37(b), the NPS has 60 days to make a decision on the plan of operations. The 60-day time period begins after the plan has been determined to be adequate under existing 36 CFR 9.36(c). Within 60 days, the Regional Director shall make one of six available final decisions in writing.

Under existing 36 CFR 9.37, failure of the NPS to make a determination on the plan of operations within the specified timeframes constitutes a rejection of the plan. The operator has a right to appeal this decision under current 36 CFR 9.49.

Temporary Access Permits

Under existing 36 CFR 9.38, the NPS may approve temporary access for purposes of “collecting basic information necessary to enable timely compliance” with the 9B regulations. This provision also authorizes the NPS to temporarily approve existing operations and new operations if the operator meets certain approval criteria.

Operating Standards

The existing 9B regulations at 36 CFR 9.41 consist primarily of nonprescriptive operating standards that provide flexibility for both the operator and the NPS to consider the most up-to-date methods, equipment, and materials to be used in the design and conduct of operations.

Although existing 36 CFR 9.41 specifies some operating standards, additional operating standards are located in other sections of the existing regulations (for example, 36 CFR 9.43 (Precautions necessary in areas where high pressures are likely to exist), 36 CFR 9.44 (Open flows and control of “wild” wells), 36 CFR 9.45 (Handling of wastes), and 36 CFR 9.46 (Accidents and fires)). Additionally, some of the existing operating standards are described broadly. For example, 36 CFR 9.41(f) requires operators to carry on all operations and maintain the site in a “safe and workmanlike manner.” Lastly, in implementing the 9B regulations over the past 36 years, the NPS has, through industry and other regulatory agency practice, developed additional operating standards that assist operators in designing acceptable plans of operations. The NPS has included some of these recommended standards in the NPS Operators Handbook. For example, chapter 4 of the NPS Operators Handbook (Drilling and Production), table 4.2 (Recommended Mitigation Measures for Drilling and Production Operations on NPS Lands) contains recommended standards for drilling and production, such as, “Design operations to use quieter equipment such as electric motors, ... Keep lighting to the minimum needed for safe operations. ... Use gravel or other appropriate road surfacing materials on access roads to minimize erosion.” The NPS has used the operating standards recommended in the NPS Operators Handbook to develop operating standards that are contained in the proposed regulation (alternative B).

Financial Assurance

The existing 9B regulations at 36 CFR 9.48(a) require an operator to file a performance bond or other acceptable method of financial assurance for all types of non-federal oil and gas operations and all phases of the operation(s). The current 9B regulations at 36 CFR 9.48(d)(2) place an upper limit on the cost of liability and reclamation of \$25,000 for geophysical surveys when using more than one field party, or \$5,000 when operating with only one field party, not to exceed \$50,000 for each well site or other operation. Existing 36 CFR 9.48(d)(3) places an overall limit on financial assurance of up to \$200,000 per operator, per unit of the national park system.

Well Plugging

The existing 9B regulations at 36 CFR 9.39(a)(2)(iv) require all operators where the surface estate is owned or controlled by the federal government to plug and cap all nonproductive wells and fill dump holes, ditches, reserve pits and other excavations. This provision contains no specific authority for the NPS to make a determination as to whether a well has continued beneficial use.

Supplementation or Revision of a Plan of Operations

Under existing 36 CFR 9.40 either the operator or the NPS may supplement or revise an approved plan of operations to respond to changed conditions or to address conditions not previously contemplated.

Access to a Mineral Right

The existing 9B regulations at 36 CFR 9.50 authorize the NPS to charge a fee for registration and use of existing roads administered by the NPS for commercial vehicles used in the conduct of non-federal operations. This provision also applies to operators who use commercial vehicles liable for damages to roads, resources, or other facilities of the NPS.

Compliance Procedure and Penalties for Prohibited Acts

The current 9B regulations at 36 CFR 9.51 hold operators liable for any damages to federally owned or controlled lands, waters, or resources resulting from a failure to comply with either the plan of operations, temporary approval, or damages caused by an “existing operation.” Operators are also required to agree to hold harmless the United States for any damages, injury, or death caused by the conduct of operations. Additionally, under this provision the NPS has the authority to suspend or revoke an approved plan of operations.

Public Participation

Under existing 36 CFR 9.52(a), when a superintendent receives a request for permission to conduct operations in a unit of the national park system, the NPS is required to “...publish a notice of this request in a newspaper of general circulation in the county(s) in which the lands are situated, or in such publications as deemed appropriate by the Superintendent.” Additionally, upon receipt of a plan of operations, a superintendent must publish a notice of availability of the plan in the Federal Register for public review and comment.

ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Alternative B includes proposed changes to the regulations that address gaps in the existing regulation and proposed reformatting of the regulation to improve its workability for both the NPS and operators. To effect these changes, the NPS must comply with applicable rulemaking provisions of the Administrative Procedures Act, 5 USC 551 – 559.

Purpose and Scope

“No Access” Exempt Operations

Under proposed 36 CFR 9.30(b), the NPS would eliminate the requirement of “access on, across, or through federally owned or controlled lands or waters,” and make the 9B applicable to “all operators conducting non-federal oil or gas operations on lands or waters within a park unit, regardless of the ownership or jurisdictional status of those lands or waters” The proposed rule would include a procedure for bringing previously exempt operations into compliance with the 9B regulations (see the “Exempt Operations” section later in this chapter).

Interests Regulations are Designed to Protect

The existing 9B regulations are not consistent in the way they describe the interests that the regulations are designed to protect. For instance, some existing regulatory provisions describe the interests to be protected as “federally owned or controlled lands or waters” (e.g., 36 CFR 9.33(c) and 9.39(1)(ii)), whereas other provisions describe the interests as “federally owned or controlled lands, waters and resources of the unit” (e.g., 36 CFR 9.37(a)(1) and 9.51(a)). The proposed rule would include new language in 36 CFR 9.30 that clarifies and makes consistent throughout that the 9B regulations are designed to protect “federally owned or administered lands, waters, or resources of park units, NPS visitor uses and experiences, or visitor and employee health and safety.” The NPS is also proposing to replace the phrase “federally owned or controlled” with the phrase “federally owned or administered” to be consistent with the terminology NPS uses to define the scope of its general regulations, at 36 CFR 1.2 (also refer to 36 CFR 1.4 (a) (definition of “National Park System”), and *NPS Management Policies 2006*).

Demonstration of Valid Existing Right

The existing regulation at 36 CFR 9.36(a)(2) requires operators to demonstrate to the NPS that they hold valid rights to conduct the activities proposed. The proposed rule would add a new section at 36 CFR 9.32(b) to clarify up front in the regulations that all operators must demonstrate to the NPS that they hold a valid existing right to conduct operations in a unit of the national park system. Without demonstrating a right, the NPS would not conduct formal review of an operator's request for access to conduct operations.

Type of Authorization Required

Proposed 36 CFR 9.32(a) is a new provision that would clarify that an operator must have a temporary access or an operations permit before conducting operations in units of the national park system. The section would make clear that if an operator already has an approved plan of operations, it may continue to operate under that approved plan.

Elimination of Unnecessary Regulatory Language

The proposed rule would delete language at existing 36 CFR 9.30(b) that summarizes application of other NPS and BLM regulations to the exercise of other mining and minerals rights that are not governed by 9B regulations. The proposed rule would delete language at existing 36 CFR 9.30(c) that discusses the design of an operator's permit application. These statements are advisory and more appropriate for inclusion in guidance materials accompanying the promulgation of the new regulations.

Operations Authorized Under Previous 9B Regulations

The proposed rule would include a new provision at 36 CFR 9.33(a) stating that if an operator currently holds an approved plan of operations issued under the existing regulations, the operator may continue to operate subject to applicable provisions of these regulations. In the event that some previously authorized operations do not meet new regulatory requirements, the NPS would use applicable procedures to assist operators in bringing their operations into compliance with new requirements.

Definitions

The proposed rule at 36 CFR 9.40 would alphabetize the definitions section to make it more user-friendly.

The proposed rule would delete several definitions from the existing 9B regulations that are already included in NPS general regulations at 36 CFR 1.4. The redundant definitions proposed for deletion include "Secretary" (existing 36 CFR 9.31(a)), "Director" (existing 36 CFR 9.31(b)), "Person" (existing 36 CFR 9.31(e)), and "Superintendent" (existing 36 CFR 9.31(f)).

The proposed rule would delete two definitions that are no longer applicable: "Commercial Vehicle" (existing 36 CFR 9.31(g)) and "Statement for Management" (existing 36 CFR 9.31(o)).

If the proposed rule does not define a term or phrase, then the definitions in 36 CFR 1.4 would apply. Further, if terms or phrases in the proposed rule and 36 CFR 1.4 conflict, the definitions of the terms and phrases in the proposed rule would apply.

Specific changes to existing definitions, or definitions for newly proposed terms, are discussed in detail below. Only terms used frequently throughout the regulation would be included in the "Definitions" section.

New or Revised Definitions

The proposed rule would add a new term “Area of Operations” to the “Definitions” section to replace “Site” under the existing rule at 36 CFR 9.31(m), to clarify where, under an approved operations permit, an operator is authorized to conduct all of its activities, including access to its mineral rights, within the units of the national park system.

The proposed rule would expand the definition of “Contaminating substances,” at existing 36 CFR 9.31(n), to broaden the substances included under this definition. The proposed rule would eliminate “waste” from the definition and include a new separate definition of waste.

The proposed rule would revise the definition of “Unit” to “NPS or National Park System Unit,” and clarify that this term is defined by “National Park System (Park area)” found at 36 CFR 1.4(a). The proposed rule would change the definition of “Operations” at existing 36 CFR 9.31(c), to consolidate and clarify “access” to include “any means from an area of operations.” The NPS intends for this proposed language to cover any and all types of access to and from an area of operations. This definition would include access via aircraft to an area of operations. Thus the NPS would eliminate the existing 36 CFR 9.32(c) that discusses access to a site via aircraft of any kind. This definition also clarifies that the operation of flowlines and gathering lines are within the definition of “Operations,” but not the installation, operation, or maintenance of transpark pipelines, which are not covered by the 9B regulations. Transpark pipelines are those lines that begin and end outside units of the national park system, are associated with a right-of-way and are owned and operated by people exercising rights not tied to the oil and gas ownership within the park boundary, and do not support 9B operations in the park.

The proposed rule would add a new term “Operations permit.” The NPS proposes to change the name of the permitting vehicle for all operations from the existing “approved plan of operations” to an “operations permit.” This change would make clear that the NPS would have the authority to recover costs from an operator associated with administering these regulations. Statutory authority for such cost reimbursement is included in 54 USC 103014. Congress specifically authorized units of the national park system to keep these funds in the park. These funds would be used for park maintenance and other improvements. Thus, the proposed rule would clarify that an operations permit shall be deemed a special use permit for purposes of cost recovery under 54 USC 103014.

The proposed rule would update the existing definition of “Operator” at 36 CFR 9.31(d) by clarifying that responsibilities and liability under these regulations can attach to the operator or those persons or entities that have legal relationships with the operator.

The proposed rule would clarify the existing definition of “Owner” at 36 CFR 9.31(i), eliminating the definition of “Person” in the existing regulations at 36 CFR 9.31(e) and consolidating these two terms under one definition.

The proposed rule would add a new term “Reconnaissance Survey,” to clarify that reconnaissance surveys do not include surface disturbance activities except minimal disturbance necessary to perform surveys.

The proposed rule would add a new term “Right to Operate” and incorporate much of the language at existing 36 CFR 36 CFR 9.36(a)(2) (right to operate description for a plan of operations). The proposed rule would clarify that an operator’s right to operate documentation must demonstrate the activities proposed are within the scope of that right.

The proposed rule would add a new term “Third-party monitor,” to clarify the necessary qualifications of a third-party monitor.

The proposed rule would add a new term “Waste” to clarify the difference between “wastes” and “contaminating substances.”

The proposed rule would add a definition of “You” to be consistent with the plain language format of these regulations.

Previously Exempt Operations

For operations that were previously exempt under existing 36 CFR 9.30(a) and 9.33, the NPS is proposing a new process that would bring these operations into compliance with the 9B regulations. These procedures are outlined at proposed 36 CFR 9.50. Under this provision, all operations within NPS boundaries would be required to obtain an operations permit. Under proposed 36 CFR 9.51 (a) - (i), within 90 days of the effective date of these regulations, operators must provide the NPS with required information that would enable the NPS to evaluate all aspects of the existing operation to determine whether these operations are being conducted in compliance with NPS operating standards.

Under proposed 36 CFR 9.52, once the operator provides all required information to the NPS, the NPS would review the operations permit application under the procedures described in proposed 36 CFR 9.100–9.105 (operations permit: application review process).

Under proposed 36 CFR 9.53(a), from the effective date of the new regulations and during the time a previously exempt operator’s application is under consideration for approval by the NPS, the continuation of operations would be strictly limited to those methods and the area of disturbance that existed on the effective date of the regulations.

Further, under 36 CFR 9.53(a)(1), prior to obtaining an approved operations permit, existing operations would be subject to general terms and conditions at proposed 36 CFR 9.120 and the prohibitions and penalties at proposed 36 CFR 9.180–9.182.

Proposed 36 CFR 9.53(a)(2) provides that with the exception of emergency situations, the NPS would not take enforcement actions against existing operators under 36 CFR 9.180–9.182 within 90 days from the effective date of the new regulations.

Finally, operations that become located within a unit of the national park system as the result of a boundary expansion would be subject to the same regulatory process as a previously exempt operation.

Temporary Access Permits

The proposed rule at 36 CFR 9.60 – 9.63 would focus solely on the information requirements and approval process for obtaining temporary approval to collect basic information to develop the information required to obtain an operations permit. The proposed rule at 36 CFR 9.61 would identify the basic information necessary for the NPS to evaluate the operator’s proposal. The proposed rule at 36 CFR 9.61(d) would specify that in order to perform reconnaissance surveys, the operator must describe the qualifications of the specialist responsible for conducting the survey. The requirement to hire a qualified specialist would codify existing NPS practice and would be included in the proposed rule so that information and conclusions are accurate and verifiable. Finally, proposed 36 CFR 9.62 would clarify that under a temporary access permit, an operator may not engage in ground disturbing activities unless they are minimal and necessary to conduct the surveys.

Accessing Oil and Gas Rights from a Surface Location Outside the Park Boundary

Proposed 36 CFR 9.70 – 9.73 would be a new stand-alone regulatory section that would address operations accessing oil and gas rights inside a park boundary from a surface location outside the park boundary. This section is largely a clarification of the existing 36 CFR 9.32(e) provision that describes the process to obtain either an operations permit or an exemption from the 9B regulations for these types of operations.

Under proposed 36 CFR 9.71, the NPS would clarify the information an operator is required to submit to the NPS under an exemption application. Under proposed 36 CFR 9.71 the NPS would direct operators to the information requirements necessary to obtain an operations permit if an operator is proposing to use hydraulic fracturing techniques.

The NPS proposes to maintain the review standard for exemption applications, “significant threat of damage to federally owned or administered lands, waters or resources of the unit while assuring the protection of park visitor and employee health and safety,” (refer to existing 36 CFR 9.32(e)). Under proposed 36 CFR 9.72, the NPS would update and clarify the process for reviewing exemption applications. Under 36 CFR 9.72, if the NPS provides notice to an operator within 30 days from the date the NPS deems the exemption application complete, then the operator must obtain an operations permit. If the NPS notifies an operator within 30 days that no further action is required by the NPS, then the operator is exempt from the 9B regulations provided that the operator is subject to the General Terms and Conditions and the Compliance Procedure and Penalties for Prohibited Acts provisions.

Finally, the NPS proposes to eliminate the language at existing 36 CFR 9.32(e) that may convey the misconception that the only causes of damage to surface and subsurface NPS resources are surface subsidence, fracture of geological formations with resultant fresh water aquifer contamination, or natural gas escape.

Operations Permit: Application Contents

Format

The proposed rule at 36 CFR 9.80 through 9.90 would describe applicable information requirements by type of operation. The proposed rule would separate information requirements into the following categories: 36 CFR 9.83 through 9.86 contains information that must be included in all operations permit applications; 36 CFR 9.87 What additional information must be included if I am proposing geophysical exploration?; 36 CFR 9.88 What additional information must be included if I am proposing drilling operations?; 36 CFR 9.89 What additional information must be included if I am proposing well stimulation operations including hydraulic fracturing?; and 36 CFR 9.90 What additional information must be included if I am proposing production operations? All operators would need to provide information listed under 36 CFR 9.83 through 9.86. The information required under 36 CFR 9.87 (Geophysical), 36 CFR 9.88 (Drilling); 36 CFR 9.89 (Stimulation) or 36 CFR 9.90 (Production) would be in addition to the information required under 36 CFR 9.83 through 9.86. The proposed format would allow the NPS and the operator to readily understand what information must be included in an operations permit application for each type of operation.

Additions to and Clarification of Existing Information Requirements

The NPS recognizes that some of the information requirements are broadly described in the existing 9B regulation at 36 CFR 9.36. To help clarify some of the information requirements at existing 36 CFR 9.36,

the NPS included guidance in the NPS Operators Handbook. All information requirements would be consolidated at 36 CFR 9.83 through 9.90 of the proposed rule.

Information Requirements that Apply to All Operations Permit Applications

Some of the information requirements at existing 36 CFR 9.36 would be incorporated into the proposed rule without change. However, the NPS is proposing to clarify the following existing information requirements.

- **Ownership Information**—The existing regulation at 36 CFR 9.36(a)(1) limits identification of key personnel related to proposed operations to the operator, owners, and lessees. In order to ensure that the NPS can contact appropriate responsible personnel for the proposed operation, the NPS is proposing under 36 CFR 9.83 that operators identify all responsible personnel related to an operation.
- **New Surface Disturbance and Construction**—Under proposed 36 CFR 9.84(c)(6) and (7) the NPS would require an operator to specify the type and extent of security at the operation site and the power sources and transmission systems for the proposed operations. This proposed addition would codify existing NPS practice.
- **Use of Water**—Proposed 36 CFR 9.83(e), “Use of Water,” would replace and clarify existing 36 CFR 9.36(a)(5). The proposed text would require the operator to provide the superintendent with information regarding the source, quantity, access route; and transportation/conveyance method for all water anticipated for use in access road and pad construction; well drilling; stimulation and production; and estimations of any anticipated wastewater, volumes generated, and how they would be managed.
- **Cultural Resources**—The NPS proposes eliminating existing section 36 CFR 9.47 “Cultural resource protection” because that section summarizes the requirements of the Antiquities Act (54 USC 320301 et seq.). The NPS is proposing this change because the requirements of the Antiquities Act operate independently of the 9B regulations. Therefore, restating the statutory requirements in the 9B regulations is redundant.
- **Spill Control and Emergency Preparedness Plan**—Proposed 36 CFR 9.86 would be a new section that consolidates various sections of the existing regulation and codifies existing practices. This section would clarify that an operator must submit a Spill Control and Emergency Preparedness Plan to the NPS, and identify the information required by the NPS for a complete Spill Control and Emergency Preparedness Plan.

Additional Information Requirements that Apply to Geophysical Operations

Proposed 36 CFR 9.87 would be a new section that clarifies the additional information a geophysical operator would need to submit to the NPS. This section would consolidate sections of the existing regulation and codify existing practices.

Additional Information Requirements that Apply to Drilling, Stimulation, and Production

Proposed 36 CFR 9.88 through 9.90 would be new sections that clarify the additional information an operator would need to submit to the NPS if the operator proposes to drill, stimulate, or produce a well. This section would consolidate sections of the existing regulation and codify existing practices.

The NPS is proposing a new section at 36 CFR 9.89 that would address well stimulation, including information requirements for proposed hydraulic fracturing operations. The NPS recognizes that

hydraulic fracture stimulation operations may require additional analyses and enhanced mitigation measures compared to drilling and completion operations that do not include hydraulic fracturing. Primary considerations include the geologic barriers between the target zone and the deepest usable quality water zone, mechanical integrity of the wellbore, water use, management of flowback fluids, and disclosure of chemicals used in the hydraulic fracturing process.

The proposed rule would codify existing practices that require an operator to submit all necessary information to ensure protection of federally owned or administered lands, waters, or resources of park units, NPS visitor uses or experiences, or visitor or employee health or safety. For hydraulic fracturing stimulation operations, the proposed rule would require injected stimulation fluids to be confined to the target zones and not impact usable quality water zones, mechanical integrity of the wellbore to be verified prior to treatment and maintained throughout treatment, water use considerations to be fully addressed, and flowback fluids to be managed to prevent harm to the environment. In addition, the NPS is requiring that operators publicly disclose chemicals used in the hydraulic fracturing process.

Operations Permit: Application Review Process

Under the proposed 36 CFR 9.100 through 9.105, the NPS would establish a new two-stage permit application review process; eliminate the dual approval standards; provide more realistic timeframes to provide notice back to an operator regarding a final decision on their application; and clarify the final decisions the NPS can make on an operator's permit application.

Two-stage Permit Application Review Process

Under the proposed 36 CFR 9.101 and 9.102, the NPS would codify the existing practice of conducting initial and formal review of an operator's proposal. The NPS is also proposing to consolidate the provisions addressing the determination of plan adequacy and the period within which the NPS must make a final decision under one section.

Initial Review

Under proposed 36 CFR 9.101, the NPS determines upon initial review whether the applicant has supplied all necessary information for the NPS to evaluate the operation's environmental effects on federally owned, controlled, or administered lands, waters, or resources, or visitor health and safety. Under the proposed rule, the NPS would be required to respond to an applicant within 30 days regardless of whether the information contained in the permit application is complete.

Formal Review

Once the NPS deems a permit application complete, the NPS would conduct a "formal review." Under proposed 36 CFR 9.102, formal review is that stage of the application review process during which the NPS evaluates whether the proposed operation meets NPS approval standards (listed under proposed 36 CFR 9.103) and must meet its compliance responsibilities under applicable federal statutes (e.g., NEPA, ESA, and NHPA).

Timeframe for Final Action

Proposed 36 CFR 9.104 would replace the existing 60-day timeframe with 180 days for the NPS to complete its formal review. This 180-day timeframe is more realistic than 60 days, given the typical time it takes for the NPS to complete its review of a proposed operation and meet its compliance

responsibilities under applicable federal statutes (e.g., NEPA, ESA, and NHPA) that may be triggered by the 9B permitting action.

The proposed rule would remove existing 36 CFR 9.37(c) that results in a rejection of the proposal if the NPS does not respond within 60 days. This provision has been rarely if ever invoked. Proposed 36 CFR 9.104 would replace existing 36 CFR 9.37(c) with a provision that authorizes the superintendent to extend the review time, if necessary. Should the review period be extended, the superintendent would be required to inform the applicant in writing of the extension and the reasons for delay.

Elimination of Dual Approval Standards

Under the proposed rule at 36 CFR 9.103, the NPS would replace the existing dual approval standards (existing 36 CFR 9.37(a)(2) and (3)) with three approval standards that apply to all operations, regardless of whether the operations are on federally or non-federally owned lands within a unit of the national park system. This proposed change is appropriate because oil and gas operations located on non-federally owned lands within a unit of the national park system may impact federally owned or controlled lands or waters similar to an operation sited on federally owned lands.

The NPS proposes to make final permit approval conditioned upon the operator providing both financial assurance to the superintendent and proof of liability insurance in an amount that would provide adequate and reasonable coverage to protect the NPS from claims arising from injuries to people or property caused by the operator.

Final Actions

The proposed rule at 36 CFR 9.104, would clarify that there are two final actions that the NPS can take on a proposed operations permit application: (1) approve, with or without conditions; or (2) disapprove.

Compliance with Big Cypress National Preserve Addition Act

In accordance with the Big Cypress National Preserve Addition Act, codified at 16 USC 698m-4, the NPS would include text at proposed 36 CFR 9.105 that describes the procedure for reviewing and approving operations permit applications submitted to exercise non-federal oil and gas activities within the Big Cypress National Preserve and Addition Area. These review and approval procedures would apply only to proposals submitted for activities within the Big Cypress National Preserve and Addition Area.

Operating Standards

The proposed rule would present a new format that makes it easier to identify all applicable operating standards for a particular type of operation. Under 36 CFR 9.110 through 9.118, the NPS is proposing to format the operating standards in the same way it proposes to format the permit application information requirements (see discussion of Permit Approval Standards above).

The proposed rule would separate operating standards into the following categories: 36 CFR 9.111 through 9.116 contains operating standards that apply to all operations; 36 CFR 9.117 What additional operating standards apply to geophysical operations?; and 36 CFR 9.118 What additional operating standards apply to drilling, stimulation, and production operations? All operators would need to comply with the operating standards listed under 36 CFR 9.111 through 9.116, while the operating standards under 36 CFR 9.117 Geophysical, or under 36 CFR 118 Drilling, Stimulation, and Production would be additive depending on the type of operation proposed.

Purpose and Function

Proposed 36 CFR 9.110 would be a new section that clarifies the purpose and function of operating standards under the proposed 9B regulations. In 36 CFR 9.110(b) the NPS would maintain the practice of setting nonprescriptive operating standards to allow operators the flexibility to design their proposed operation using the latest technological innovations that would best protect park system resources, values, and visitor health and safety.

Proposed 36 CFR 9.110(c) would provide that in designing an operation, an operator must use methods, equipment, and materials least damaging to NPS resources and values while assuring human health and safety. This overarching standard would be incorporated into each individual operating standard found in the subsequent sections as if stated directly in each standard.

Finally, the NPS is proposing in 36 CFR 9.110(a) to maintain the practice of incorporating operating standards by reference into an approved operations permit so that the operating standards become enforceable terms and conditions of an approved permit under the prohibitions and penalties provision at proposed 36 CFR 9.180 through 182.

Additions to and Clarification of Existing Operating Standards

The NPS would incorporate some operating standards from the existing regulations into the proposed rule largely without substantive change. The standards summarized below would either clarify existing standards or are new standards that the NPS proposes to add to the regulations.

Operating Standards that Apply to All Operations

The NPS is proposing to include new standards at 36 CFR 9.111(a) in the regulations to ensure that either existing or newly created surface disturbance is kept to the minimum necessary for safe conduct of operations.

The NPS is proposing to include new standards at 36 CFR 9.114 and 9.115 that are designed to reasonably limit the visual and sound impacts of oil and gas operations on park visitor experience.

The NPS is proposing to add a new standard at 36 CFR 9.111(h) to avoid or limit the introduction of exotic species.

Finally, the NPS is proposing to add specific standards at 36 CFR 9.112 addressing natural processes, including maintenance of native soil profiles and hydrologic connectivity. These standards are consistent with the overall NPS management goals of maintaining natural processes.

Reclamation Operating Standards

Proposed 36 CFR 9.116 would specify reclamation operating standards.

Operating Standards that Apply to Geophysical Operations

The proposed standards in 36 CFR 9.117 would codify existing practice and standards developed and included in the NPS Operator's Handbook.

Operating Standards that Apply to Drilling, Stimulation, and Production Operations

The NPS is proposing 36 CFR 9.118(a)(1) to codify existing practice of requiring all operators to use containerized circulating mud systems.

The NPS is proposing at 36 CFR 9.118(a)(2) to codify the existing practice requiring that operators may not establish new earthen pits for any use. For existing earthen pits, those uses may continue subject to the superintendent's inspection to ensure protection of federally owned or administered lands, waters, or resources of park units, NPS visitor uses or experiences, or visitor or employee health or safety. If the superintendent determines that the pit needs to be lined or removed, the superintendent may require the operator to take such action.

The NPS is proposing a new section at 36 CFR 9.118(b) on well stimulation that would include operating standards for hydraulic fracturing operations. The NPS recognizes that hydraulic fracture stimulation operations require additional analyses and enhanced mitigation measures compared to drilling and completion operations that do not include hydraulic fracturing. Primary considerations include the geologic barriers between the target zone and the deepest usable quality water zone, mechanical integrity of the wellbore, water use, management of flowback fluids, and disclosure of chemicals used in the hydraulic fracturing process.

General Terms and Conditions

The NPS is proposing a new "General Terms and Conditions" section to summarize in one place in the regulations those requirements and conditions that are administrative in nature (both terms and conditions of a permit as well as monitoring and reporting requirements) and that apply to every operation conducted within a unit of the national park system. This section would incorporate existing regulatory provisions at 36 CFR 9.36(a)(15) and (18); 9.41(g); 9.46; 9.47(b) and 9.51(b) into one section.

This provision would also update existing 36 CFR 9.35 (Use of Water). Existing regulatory language at 36 CFR 9.35 does not address all state water law systems under which water rights are established or decided. To remedy this deficiency, the NPS proposes to delete language that describes particular water law systems. The proposed language would require that the use of surface or groundwater having NPS water quantity or water quality management responsibility must be approved by the NPS in accordance with NPS policy (refer to 36 CFR 9.120(e)).

Current NPS practice is to require operators to hire third-party monitors which has proven successful in ensuring operator compliance with the terms and conditions of an approved plan of operations. The NPS would now codify this practice under 36 CFR 9.121(b). The proposed rule would make clear that the operator would be responsible for paying the cost of the third-party monitor; however, the monitor would report directly to the NPS. This requirement is to ensure proper oversight and accountability of the third-party monitor.

Under proposed 36 CFR 9.121(d), the NPS would add the requirement to include the reports of the natural resource and the cultural resource surveys for the proposed area of operations. The NPS would include this to codify existing NPS practice.

Under existing 36 CFR 9.42, the reporting requirement is unnecessarily tied to the reports that are required to be submitted to a state or federal permitting agency. Under proposed 36 CFR 9.121(e), the NPS would eliminate this limitation and would require operators to submit reports as requested by the superintendent to ensure compliance with these regulations.

Access to a Mineral Right

The proposed rule at 36 CFR 9.131(a)(1) would supplement the existing regulation by authorizing a fee for newly established privileged access across federal lands outside the boundary of an operator's mineral right.

Financial Assurance

Under proposed 36 CFR 9.141 the NPS would make the amount of financial assurance equal to the estimated cost of plugging and reclamation.

The proposed rule would explain how the NPS estimates the amount of financial assurance (36 CFR 9.141); detail the process for adjusting the amount of financial assurance due to changed conditions (36 CFR 9.142); describe the condition under which the NPS would release the financial assurance (36 CFR 9.143); and describe the circumstances that would result in the operator forfeiting its financial assurance (36 CFR 9.144).

Finally, the NPS is proposing at 36 CFR 9.144(b)(3) to include a new provision that would allow the NPS to suspend or discontinue review of an operator's new or pending permit applications for operations in any unit of the national park system, if that operator has forfeited its financial assurance for an already approved operation. This provision would provide further incentive for operators to comply with the 9B regulations.

Modification to an Operation

Proposed 36 CFR 9.150 would retain text that either the NPS can require modification of the operator's permit or the operator can request that the NPS modify their permit. Further, this section would describe the procedures for the operator or the NPS to request modification.

The NPS is proposing to replace the existing approval criteria at 36 CFR 9.150(a) with the proposed approval criteria that applies to either a temporary access permit (36 CFR 9.62) or operations permit (36 CFR 9.104). The NPS views this as a better approach since a permit modification must meet the same approval criteria as those applied to the original permit.

The proposed rule at 36 CFR 9.150(c) would contain a prohibition on an operator implementing the modification until and unless the NPS has provided written approval of the modification to the operator.

Change of Operator

Under the proposed rule at 36 CFR 9.160, a previous operator would remain liable to the NPS until such time as the new operator either ratifies an operations permit, submits a new permit application, or submits a plan to plug and reclaim, and provides proof of adequate liability insurance and posts adequate financial assurance. Under proposed 36 CFR 9.160(b) the previous operator would be responsible for notifying the NPS of its transfer of the operation and must submit specific information regarding the transfer to the NPS within 30 calendar days of the transfer.

Under proposed 36 CFR 9.161(a)(1), the new operator must adopt and agree to conduct operations under the terms and conditions of any previous operator's operations permit and submit certain information to the NPS including the current operator's course of action.

Well Plugging

Under the proposed rule at 36 CFR 9.170, the NPS would establish a well plugging determination procedure that considers the operator's actions with respect to the well after drilling operations cease or after completion of operations. The proposed rule at 36 CFR 9.171 would allow an operator to seek an extension from the NPS plugging determination if it can meet certain criteria.

Prohibitions and Penalties

The proposed rule would eliminate the suspension provision under existing 36 CFR 9.33(c). Because the NPS is proposing to bring all operations in units of the national park system into compliance with the 9B regulations, the suspension provision at 36 CFR 9.33(c) would no longer be applicable. Under the proposed rule, the NPS would retain the existing liability provision under 36 CFR 9.51(a).

The existing regulation at 36 CFR 9.51(c)(1) and (2) provides different compliance procedures for suspending an operation depending on whether the violation constitutes an "immediate threat of significant injury to federally owned or controlled lands or waters." The NPS would retain authority to suspend an operation or revoke an operations permit, but the proposed rule at 36 CFR 9.181 would grant the superintendent the discretion to use suspension authority regardless of whether an operator's violation poses an "immediate threat of significant injury."

Prohibited Acts

Under the proposed rule at 36 CFR 9.180, the NPS would add a new provision that lists the prohibited acts under the regulations in order to give operators and NPS staff notice of the acts that would constitute a violation of the 9B regulations.

The NPS is proposing to expand the prohibited acts to include not only violation of the terms and conditions of an operations permit, but also violations of any other applicable provision of the regulations in order to address those instances where an operator does not yet have an operations permit.

Incorporating Existing 36 CFR 1.3 Penalties Provision in the 9B Regulations

Under existing 36 CFR 9.51, the NPS has two enforcement tools: suspension of an operation and revocation of an operator's plan of operations. Although these tools are useful to correct violations of the regulations that constitute a major threat to NPS resources, they are generally not an effective tool to correct minor acts of noncompliance. Minor acts of noncompliance can vary from lack of general housekeeping on the operation site to improper road maintenance or not maintaining proper site security.

Under existing 36 CFR 1.3, the NPS is authorized to issue a fine as provided by law, or imprisonment not to exceed 6 months, or both, to a person convicted of violating a provision of the regulations contained in parts 1 through 7, 12, and 13 of 36 CFR 1. Under the proposed rule the NPS would incorporate 36 CFR 1.3 into the 9B regulations. The authority under 36 CFR 1.3 for NPS law enforcement to issue fines to operators for minor acts of noncompliance or to a noncompliant operator who has shut-in their well would provide a meaningful incentive for these operators to come into compliance with NPS standards.

No New Authorization Unless Operator is in Compliance

Proposed 36 CFR 9.182 is a new provision that would provide notice to operators that if they are in violation of the 9B regulations in any unit of the national park system, the NPS would not undertake review of a new operating permit application or continue to review a pending permit application. This

provision is meant to encourage operators to come into compliance with NPS regulations and ensure that noncomplying operators are not issued further permits until existing violations are corrected.

Public Participation

The proposed rule would replace the public notice steps currently required under existing 36 CFR 9.52(a) and (b) with a new subsection regarding notice at 36 CFR 9.200(b). Under proposed 36 CFR 9.200(b), the NPS would provide the public with notice in accordance with the requirements of NEPA, Council on Environmental Quality (CEQ) Regulations, and NPS NEPA policy. This would clarify that the notice required under NEPA is sufficient as public notice for oil and gas permit applications received by the NPS, and no additional notice would be needed. Due to the possibility of changing CEQ and NPS NEPA regulations and policy, the NPS believes that this topic should be discussed only generally in the 9B regulations to avoid conflicting with future modifications to CEQ or general NPS regulations. It should also allow flexibility to use technologies such as the internet rather than requiring publication in local newspapers.

ALTERNATIVE C: MODIFIED PROPOSED RULE

Alternative C would include all the proposed changes in alternative B, except as follows.

Purpose and Scope

Directional Drilling Operations—Alternative C would expand NPS jurisdiction under the regulations to encompass surface and subsurface directional drilling operations outside the boundary of the park. Thus, directional drilling operations would be treated the same as new operations under alternative C.

Under the proposed regulation at 36 CFR 9.30, the NPS would specifically state that the 9B regulations apply if an operator is “using directional drilling techniques from a surface location outside the boundary of a unit which results in the drill hole crossing into the unit.” Also, under proposed 36 CFR 9.40, the definition of “Operations” would be modified to include access by any means of ingress to or egress from an area of operations; construction; geological and geophysical exploration; drilling (*including directional drilling operations outside the boundary of a unit of the national park system, both surface and subsurface operations, which result in the wellbore crossing into a unit...*) [emphasis added].

Proposed Operations Located Wholly on Non-Federally Owned Land Within the Boundary of a Park Unit

The NPS would create a new provision that addresses operations located wholly on non-federally owned lands within a unit of the national park system. This provision would require an operator to submit certain information that would allow the NPS to fully analyze potential impacts on federally owned or administered lands or waters, resources, or visitor health and safety. If the NPS determines that it does not reasonably expect “that operational requirements are needed to protect against a significant threat of damage to federally owned, administered, or controlled lands, waters or resources of the unit, or park visitor and employee health and safety,” then the operator would not be required to obtain an operations permit, provided that the operator would still be subject to the general terms and conditions at proposed 36 CFR 9.120 through 9.122 and the prohibitions and penalties in proposed 36 CFR 9.180 through 9.182. This provision would address existing operations that are located wholly on non-federally owned or administered lands within a unit.

Prohibitions and Penalties

Under proposed 36 CFR 9.180 through 9.182, mineral owners and their lessees would be jointly and severally liable for all obligations to comply with the terms and conditions of an approved permit and any other applicable provision under these regulations that accrue while they hold their interests.

Table 5. Comparison of Alternatives: Substantive Proposed Changes to NPS Non-Federal Oil and Gas Rights Regulations (36 CFR Part 9, Subpart B)

TABLE 5. COMPARISON OF ALTERNATIVES: SUBSTANTIVE PROPOSED CHANGES TO NPS NON-FEDERAL OIL AND GAS RIGHTS REGULATIONS (36 CFR PART 9, SUBPART B)

Regulatory Provisions	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Purpose and scope	The existing 9B regulations only control activities that are “within any unit of the national park system in the exercise of rights to oil and gas not owned by the United States where access is on, across or through federally owned or controlled lands or waters.”	<p>9B regulations would be applicable to any operation within the boundary of a park unit.</p> <p>Would make administrative and formatting changes:</p> <ul style="list-style-type: none"> • Make consistent throughout the regulation the description of the interests regulations are designed to protect • Move requirement to demonstrate valid existing right upfront in the regulations • Describe the types of authorizations required • Eliminate unnecessary regulatory text • Address operations authorized under previous 9B regulations. 	<p>NPS jurisdiction under the 9B regulations would be expanded to encompass surface and subsurface directional drilling operations outside the boundary of the park.</p> <p>The provision specifically states that the 9B regulations apply if an operator is using directional drilling techniques from a surface location outside the boundary of a unit which results in the drill hole crossing into the unit.</p>
Definitions	Existing section containing definitions for common terms used in the 9B regulations.	<p>Would eliminate unnecessary or outdated definitions, add new definitions, and clarify existing definitions.</p> <p>Would clarify that the permitting vehicle changes from “approved plan of operations” to “operations permit,” which shall be deemed a special use permit for cost reimbursement under 54 USC 103014.</p>	Same as alternative B, except the definition of “Operations” would be modified to clarify that both surface and subsurface operations outside a boundary, which result in the wellbore crossing into a unit, are subject to the 9B regulations.

Regulatory Provisions	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Proposed operations located wholly on non-federally owned land within the boundary of a park unit	N/A	N/A	<p>New provision would require an operator to submit certain information that would allow the NPS to fully analyze potential impacts on federally owned or administered lands or waters, resources, or visitor health and safety. If the NPS determines that it does not reasonably expect that operational requirements are needed to protect against a significant threat of damage to federally owned, administered, or controlled lands, waters or resources of the unit or park visitor and employee health and safety, then the operator would not be required to obtain an operations permit, provided that the operator would still be subject to the general terms and conditions in proposed 36 CFR 9.120 through 9.122 and the prohibitions and penalties in proposed 36 CFR 9.180 through 9.182.</p> <p>Would apply to previously exempt operations located wholly on non-federal lands within a unit of the national park system.</p>
Exempt operations	<p>Under existing 36 CFR 9.30 operations are exempt from the regulations where no access is on, across, or through federally owned or controlled lands or waters in a unit of the national park system.</p> <p>Under 36 CFR 9.33, if operations were being conducted as of the effective date of the regulations and the operator held a federal or state permit for those operations, that operation was grandfathered and not subject to the plan of operations requirement.</p>	<p>Every operation located within the boundary of the unit, including all operations previously exempt from the regulations, would be required to obtain an operations permit.</p> <p>Would establish a process to bring previously exempt operations into compliance with regulations.</p>	<p>Same as alternative B, except as noted above in this table (refer to the row for "Proposed operations located wholly on non-federally owned land within the legislative boundary of a park unit").</p>

Table 5. Comparison of Alternatives: Substantive Proposed Changes to NPS Non-Federal Oil and Gas Rights Regulations (36 CFR Part 9, Subpart B)

Regulatory Provisions	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Accessing oil and gas rights inside a park unit boundary from a surface location outside the park unit boundary (directional drilling from outside a park to a bottomhole location inside a park unit)</p>	<p>Under the existing 9B regulations, the scope of regulatory jurisdiction is limited to operations conducted inside the boundary of the unit. Operators may apply for an exemption from the regulations if they use directional drilling techniques from a surface location outside a unit of the national park system to reach the bottomhole location of their non-federal oil and gas rights within NPS boundaries.</p>	<p>Would create a new stand-alone provision. Would retain the scope of the existing provision and clarify the process to obtain either an operations permit or an exemption from the 9B regulations for these types of operations.</p>	<p>As noted above, would expand NPS jurisdiction under the 9B regulations to encompass surface and subsurface directional drilling operations outside the boundary of the park.</p>
<p>General terms and conditions</p>	<p>Scattered throughout various provisions of the existing regulations.</p>	<p>Would establish new provisions that summarize in one place in the regulations the requirements and conditions that are administrative in nature and that apply to every operation conducted within a unit of the national park system. Would add a new requirement allowing third party monitors access to the operations site (36 CFR 9.121(b)).</p>	<p>Same as alternative B.</p>

Regulatory Provisions	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Transfers of interest	Under the existing regulation, previous owner remains liable on its financial assurance until it notifies the NPS that the rights have been transferred to another party. A new owner cannot operate until it posts financial assurance and ratifies the existing plan of operations.	<p>Previous operator would remain liable to the NPS until such time as the new operator either ratifies an operations permit, submits a new permit application, or submits a plan to plug and reclaim, and provides proof of adequate liability insurance, and posts adequate financial assurance. The previous operator would be responsible for notifying the NPS of its transfer of the operation.</p> <p>New operator must adopt and agree to conduct operations under the terms and conditions of any previous operator's operations permit and submit certain information to the NPS including deciding on its course of action.</p>	Same as alternative B.
Information requirements to obtain a permit	Existing regulation contains information requirements for an operator to submit a complete plan of operations. Some of these information requirements are described broadly. To help clarify some of the information requirements in existing 36 CFR 9.36, the NPS included guidance in the 2006 NPS Operators Handbook that more clearly describes some of the information requirements in the regulations.	<p>The revised rule would present information requirements in a new format that would allow the operator to readily understand, depending on the type of operation, exactly what information must be included in a proposed plan of operations.</p> <p>Provision would clarify some existing information requirements and codify existing practices.</p>	Same as alternative B.

Table 5. Comparison of Alternatives: Substantive Proposed Changes to NPS Non-Federal Oil and Gas Rights Regulations (36 CFR Part 9, Subpart B)

Regulatory Provisions	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Permit approval standards	The existing regulations establish dual approval standards depending on whether the surface interest upon which the operation is located is held by a non-federal entity or held by the United States. The timeframe for approval is 60 days from the receipt of a plan of operations.	Would establish a new two-stage permit application review process, eliminate the dual approval standards, provide more realistic timeframes to provide notice back to an operator regarding a final decision on their application, and clarify the final decisions the NPS can make on an operator's permit application.	Same as alternative B.
Temporary access permits	Under the existing regulation, the NPS may approve temporary access for purposes of "collecting basic information necessary to enable timely compliance" with the 9B regulations. This provision authorizes the NPS to temporarily approve existing operations and new operations if the operator meets certain approval criteria.	Would focus solely on the information requirements and approval process for obtaining temporary approval to collect basic information to develop the information required to obtain an operations permit.	Same as alternative B.
Operating standards and terms and conditions	The existing regulation specifies some operating standards. Others are contained in other regulations. To help clarify some of the operating standards, the NPS included guidance in the NPS Operators Handbook that more clearly describes some of the information requirements in the regulations.	The new format would make it easier to identify all applicable operating standards for a particular type of operation in to one section of the regulation. Provision would clarify some existing operating standards and codify existing practices.	Same as alternative B.

Regulatory Provisions	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Financial assurance	<p>The existing regulation requires that each operator who has an approved plan post a performance bond or other acceptable security with the NPS. The existing regulations place a limit on the liability amount the NPS can set per operation. The liability caps are as follows: \$25,000 for geophysical surveys when using more than one field party or \$5,000 when operating with only one field party; \$50,000 for each well site or other operation; and a total limit of \$200,000 per operator, per unit.</p>	<p>Would make the amount of financial assurance equal to the estimated cost of plugging and reclamation.</p> <p>The proposed rule would explain how the NPS estimates the amount of financial assurance; detail the process for adjusting the amount of financial assurance due to changed conditions; describe the condition under which the NPS would release the financial assurance; and describe the circumstances that would result in the operator forfeiting its financial assurance.</p> <p>Would allow the NPS to suspend or discontinue review of an operator's new or pending permit applications for operations in any unit of the national park system, if that operator has forfeited its financial assurance for an already approved operation.</p>	Same as alternative B.
Well plugging	<p>Existing regulation plugging requirements contain no specific authority for the NPS to make a determination as to whether a well has continued beneficial use. States typically exercise such authority under their oil and gas regulatory programs to ensure that operators are not delaying their responsibility to plug unproductive wells.</p>	<p>Clarifies that operators are responsible for well plugging and establishes NPS well plugging approval and well plugging determination procedures that consider the operator's actions with respect to the well after drilling operations cease or after completion of operations.</p> <p>Would allow an operator to seek an exemption from the NPS plugging determination if it can meet certain criteria.</p>	Same as alternative B.

Table 5. Comparison of Alternatives: Substantive Proposed Changes to NPS Non-Federal Oil and Gas Rights Regulations (36 CFR Part 9, Subpart B)

Regulatory Provisions	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Supplementation or revision of a permit	Existing regulation authorizes either the operator or the NPS may supplement or revise an approved plan of operations to respond to changed condition or to address conditions not previously contemplated.	<p>Would retain text that either the NPS can require modification of the operator's permit or the operator can request that the NPS modify their permit.</p> <p>Would describe the procedures for both the operator and the NPS to request modification.</p> <p>Would tie in approval criteria that applies to either a temporary access permit or operations permit.</p> <p>Would prohibit an operator from implementing the modification until and unless the NPS has provided written approval of the modification to the operator.</p>	Same as alternative B.
Access to a mineral right	Under the existing regulation, the NPS can charge a registration fee for use of park roads, but no other compensation is addressed.	Would supplement the existing regulation by authorizing a fee for new privileged access across federal lands outside the boundary of an operator's mineral right.	Same as alternative B.
Compliance procedure and penalties for prohibited acts	Existing regulation holds operators liable for any damages to federally owned or controlled lands, waters, or resources resulting from a failure to comply with either the plan of operations, temporary approval, or damages caused by an "existing operation." Operators are also required to agree to hold harmless the United States for any damages, injury, or death caused by the conduct of operations. Additionally, under this provision the NPS has the authority to suspend or revoke an approved plan of operations.	<p>The proposed rule would add a new section that lists the prohibited acts under the regulations in order to give operators clear notice of the type of acts that are not authorized.</p> <p>Would incorporate existing penalties provision at 36 CFR 1.3 into the 9B regulations.</p> <p>Would retain suspension and revocation authority.</p> <p>Would establish new provision that if operators are in violation of the 9B regulations, in any unit of the national park system, the NPS would not continue to review a pending permit application, or undertake review of a new operating permit application.</p>	Would hold mineral owners and their lessees jointly and severally liable for obligations to comply with the terms and conditions of an approved permit and any other applicable provision under these regulations that accrue while they hold their interests.

Regulatory Provisions	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Public participation	Under the existing regulation, when a superintendent receives a request for permission to conduct operations in a unit of the national park system, the NPS is required to “publish a notice in a newspaper of general circulation in the county(s) in which the lands are situated, or in such publications as deemed appropriate by the superintendent.” Additionally, upon receipt of a plan of operations, a superintendent must publish a notice of availability of the plan in the Federal Register for public review and comment.	Would replace the public notice steps currently required with a new requirement to provide the public with notice in accordance with the requirements of NEPA, CEQ regulations, and NPS NEPA policy.	Same as alternative B.

HOW ALTERNATIVES MEET OBJECTIVES

As stated in “Chapter 1: Purpose of and Need for Action,” all action alternatives selected for analysis must meet all objectives to a large degree. The action alternatives must also address the stated purpose of taking action and resolve the need for action; therefore, the alternatives were individually assessed in light of how well they would meet the objectives for this rulemaking and EIS (refer to “Chapter 1: Purpose of and Need for Action”). Alternatives that did not meet the objectives were not analyzed further (refer to the “Alternatives Eliminated from Further Consideration” section in this chapter).

Table 6 is a comparison of how each of the alternatives described in this chapter would meet the project objectives. Table 7 presents a brief summary of the impacts of each alternative by impact topic. These impacts are more thoroughly described in “Chapter 4: Environmental Consequences.”

TABLE 6. SUMMARY OF HOW ALTERNATIVES MEET PROJECT OBJECTIVES

Objective	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
All non-federal oil and gas operations conducted within the authorized boundaries of park units, regardless of ownership and jurisdictional status, are regulated under the 9B regulations in a manner that uses technologically feasible least damaging methods so as to prevent or to minimize damage to national park system resources, visitor values, and management objectives.	Does not meet objective—The existing regulation does not apply to exempt operations, which are not required to meet the current standard of least damaging methods so as to prevent or to minimize damage to national park system resources, visitor values, and management objectives.	Meets objective—The proposed rule would require operations permits for all operations, including previously exempt operations. All operations would be required to meet the least damaging methods standard.	Meets objective—Same as alternative B.
Non-federal oil and gas development in parks is conducted in a manner which ensures, to the maximum extent possible, that all units of the national park system remain unimpaired and resources are conserved for the enjoyment of present and future generations.	Partially meets objective—Under the existing regulation, exempt operations are not required to meet current standards that apply to nonexempt operations and could severely impact federally owned or administered lands, waters, or resources of park units, NPS visitor uses or experiences, or visitor or employee health or safety.	Meets objective—The proposed rule would codify existing practices such as information requirements and require operations permits for all new operations, including those previously exempt operations. All operations would be required to meet the least damaging methods standard.	Meets objective—Same as alternative B.
Operating standards are updated to incorporate new scientific findings, technologies, and methods least damaging to park resources and values.	Does not meet objective—Operating standards in the existing regulation consist primarily of broadly described, nonprescriptive operating standards. The NPS has developed additional operating standards that are described in its Operators Handbook.	Meets objective—The proposed rule would maintain existing operating standards, incorporate operating standards described in the NPS Operators Handbook, and include new standards applicable to hydraulic fracturing stimulation techniques.	Meets objective—Same as alternative B.

Table 6. Summary of How Alternatives Meet Project Objectives

Objective	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Both the public and park personnel are protected from health and safety hazards associated with non-federal oil and gas operations.	Partially meets objective—NPS has the authority to shut down operations if it has determined that a violation constitutes an “immediate threat of significant injury.” Despite this authority, however, possible public health and safety issues may persist at exempt operations.	Meets objective—The proposed rule would grant the superintendent the discretion to use suspension authority regardless of whether a violation poses an “immediate threat of significant injury.” Additionally, in the event that previously authorized operations do not meet new regulatory requirements, NPS could use procedures to assist operators in bringing their operations into compliance with new requirements.	Meets objective—Same as alternative B.
Financial assurance provided by non-federal oil and gas operators is adequate to ensure that park resources and values are protected and all operation sites are properly reclaimed.	Does not meet objective—The existing regulation places a limit on the amount of financial assurance required by operators. The actual costs of plugging and reclamation often exceed the limit.	Meets objective—Under the proposed rule, the amount of financial assurance would be equal to the estimated costs of plugging and reclamation.	Meets objective—Same as alternative B.
The regulations provide a practical and effective means for dealing with minor acts of noncompliance or with illegally conducted operations (unauthorized operations) in parks.	Partially meets objective—The existing regulation holds operators of existing operations liable for any damages to federally owned or controlled lands, waters or resources. NPS has authority to suspend or revoke an approved plan of operations.	Meets objective—Proposed regulation would incorporate the existing 36 CFR 1.3 NPS Penalties Provision, strengthening the NPS’ ability for dealing with acts of noncompliance.	Meets objective—Same as alternative B.
Operators compensate the United States for use of federally owned land outside the boundary of their non-federal oil and gas property interest.	Partially meets objective—Existing regulatory provisions hold operators who use commercial vehicles liable for damages to NPS roads, resources or facilities and authorize NPS to charge a registration fee for use of existing NPS-administered roads by commercial vehicles used in the conduct of non-federal operations.	Meets objective—In addition to the provision in alternative A, the proposed rule would authorize a fee for new privileged access across federal lands outside the boundary of an operator’s mineral right.	Meets objective—Same as alternative B.

Objective	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>The regulations are more understandable to operators, the public, and park staff.</p>	<p>Partially meets objective—Definitions are provided for common terms used; however, terms and conditions, permit informational requirements, and operating standards are scattered throughout the existing regulation as well as in separate guidance documents.</p>	<p>Meets objective—Specific changes to existing definitions and definitions for new terms would be made and definitions that are no longer applicable would be removed. The sections permit information on requirements, and operating standards have been reorganized so that information is in one section of the regulation and in codify existing guidance. For easier identification, the proposed rule would separate new information requirements and operating standards in to those that apply to all operations and then additional requirements applicable to exploration, drilling, and production. Operating standards may be tied to certain impact topics, which would provide more clarity to the operator and the NPS regarding the resource protection goals for each aspect of a particular operation.</p>	<p>Meets objective—Same as alternative B.</p>
<p>Regulation of oil and gas wells directionally drilled beneath parks from surface locations outside parks retains the incentive for operators to site such operations outside park boundaries while still maintaining the ability of the NPS to protect park resources and values to the fullest extent practical.</p>	<p>Meets objective—Surface activities located outside the NPS boundary associated with directional drilling operations developing oil and gas rights inside the NPS boundary are not within the scope of the existing regulation, and there is an incentive to site operations outside the park boundary.</p>	<p>Meets objective—Same as alternative A, however a new stand-alone section in the proposed regulation would provide clarification of existing provisions and describe the process to obtain an operations permit or an exemption for these types of operations; the incentive to site operations outside the park boundary remains.</p>	<p>Does not meet objective—NPS jurisdiction would be extended to include surface and subsurface directional drilling operations outside the boundary of the park. Directional drilling operations would be treated as new operations and would require operations permits. There would be little incentive to site operations outside the park boundary.</p>

TABLE 7. SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Geology and Soils	<p>Continuing impacts on geology and soils from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites (operations not regulated under the 9B regulations). Adverse effects could include erosion, contamination, change in soil chemistry and productivity, and possible effects on unique geological features if not protected. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on geology and soils. Directionally drilled wells would continue to be a potential source of indirect adverse effects on park soils if they are sited close to the parks and contaminated soils or water leaves the site.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on geology and soils, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts due to erosion or runoff.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on geology and soils in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on geology and soils, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects. Benefits would accrue primarily from reduced risk to geology and soils due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in improved erosion/sedimentation control, storm water management, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B.</p> <p>The extension of regulatory authority and oversight to currently exempt operations would be as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. The extension of NPS regulatory authority to include directionally drilled wells could result in long-term beneficial impacts on geology and soils because NPS standards would apply to locations inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to geology and soils within park units compared to the existing condition.</p> <p>Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>Both adverse and beneficial cumulative impacts would accrue from actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Air Quality	<p>Continuing impacts on air quality from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include vehicles and heavy equipment emissions and nitrogen oxides, volatile organic compounds, carbon monoxide, sulfur dioxide emissions, and odors from operating large engines, pumps and auxiliary equipment. Plugging and reclamation of wells would result in short-term adverse and long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on air quality. Directionally drilled wells would continue to be a potential source of adverse effects, depending on the wind direction, proximity to the park, and mitigation measures employed.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on air quality, due to a possible lack of funding or enforcement that can reduce the ability to ensure lower emission equipment, prolonged VOC emissions from leaking wells, or require that low sulfur diesel is being used.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on air quality in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, whereas adverse effects would accrue from the continued lack of federal regulation governing operation of exempt wells.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on air quality, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Previously exempt operations would be required to obtain an operations permit, which would result in long-term beneficial impacts on air quality from improved operating requirements from those operations. Directionally drilled wells would continue to be a potential source of adverse effects, depending on the wind direction, proximity to the park, and mitigation measures employed, as described under alternative A.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would have potentially beneficial impacts from timely plugging and reclamation, compliance with 9B regulations, and increased monitoring and evaluation of operations compared to the existing condition. There would be short-term adverse impacts on air quality from the use of construction equipment during reclamation activities.</p> <p>When combined with beneficial and adverse impacts from implementation of alternative B, cumulative impacts would be long term and both adverse and beneficial, and proposed 9B regulations would represent only a slight contribution to overall cumulative impacts on air quality in the study area.</p>	<p>Under alternative C, impacts on air quality would also be primarily beneficial when compared to the existing condition. Impacts would be the same as those described under alternative B with the exception of previous exempt operations, directional drilling, and enforcement and penalties.</p> <p>Wells that are currently exempt from the regulations would become subject to standards and review that would provide the indirect benefit of minimizing impacts on air quality through establishing greater protections and emissions standards for equipment, resulting in long-term beneficial impacts. With expanded NPS jurisdiction for directional drilling under alternative C, more operators could be required to adhere to 9B regulations, resulting in the potential for beneficial impacts on air quality. However air quality impacts are felt regionally, so the specific location of directional drilling operations would not change the adverse impact on the airshed, although there may be increased localized impacts from particulates and odors if sites are located in the park.</p> <p>Under alternative C, enforcement and penalties would hold both operators and owners liable for compliance, which would increase the incentive for owners to ensure operators comply with 9B regulations, including all regulations which could reduce impacts on air quality. Therefore, alternative C would have long-term beneficial impacts on air quality.</p> <p>Similar to alternative B, cumulative impacts would be long-term and both adverse and beneficial, with alternative C contributing mostly beneficial impacts from bringing previously exempt operations under regulation.</p>

Table 7. Summary of Environmental Consequences

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Water Resources (including surface and groundwaters and both quality and quantity)</p>	<p>Continuing impacts on water resources from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include erosion and sedimentation of water bodies, contamination of water from leaks and spills and possible groundwater contamination from well casing leaks. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have very minimal and generally localized effects on water resources. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated run off leaves the site and enters the park.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have small indirect effects on resources, including water resources, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts due to erosion or runoff.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on water resources in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on water resources, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from reduced risk to water resources due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in improved erosion / sedimentation control, storm water management, spill prevention and countermeasure actions, well plugging standards, and improved standards / required information for well stimulation including hydraulic fracturing operations, compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Overall these regulatory improvements would result in long-term indirect beneficial impacts on water resources.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, similar to alternative B, impacts of the regulatory changes would also be primarily beneficial when compared to the existing condition.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on water resources because NPS standards would apply inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to water resources within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on water resources, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Wetlands	<p>Continuing impacts on wetlands from both regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include continued impacts on the functions and values of the wetland communities, changes to hydrology, impacts on water quality from runoff and sedimentation, stormwater impacts, changes to the abundance and diversity of wetland plant species and wildlife use, and wetland connectivity to adjacent habitats. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on wetlands. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site and enters wetland resources.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including wetlands, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on wetlands in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on wetlands, compared to the existing condition. Previously permitted operations would continue with no change in effects. Benefits would accrue primarily from reduced risk to wetlands due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in improved erosion / sedimentation control, storm water management, improved spill prevention (contamination) and countermeasure actions, as well as reduction in altered hydrology and beneficial effects on wetland function and values, compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, similar to alternative B, impacts of the regulatory changes would also be primarily beneficial, when compared to the existing condition. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on wetlands because NPS standards would apply inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to wetlands within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on wetlands, primarily from bringing previously exempt operations under regulation. Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Table 7. Summary of Environmental Consequences

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
Floodplains	<p>Continuing impacts on floodplains from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include erosion (including off-site effects), contamination from spills and improper flood-proofing, altered hydrology, change in soil chemistry and vegetation productivity, and possible effects on floodplains function and values if not protected. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on floodplains.</p> <p>Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site and enters floodplains resources.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including floodplains, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on floodplains in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on floodplains, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from reduced risk to floodplains due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in improved erosion / sedimentation control, storm water management, improved spill prevention (contamination) and countermeasure actions, as well as improvements to hydrology, soil, and vegetation productivity within the floodplain, compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on floodplains because NPS standards would apply inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to floodplains within park units compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on floodplains, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Vegetation (including plant species of special management concern)</p>	<p>Continuing impacts on vegetation from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include erosion (including off-site effects), contamination, introduction of nonnative plant species, change in plant health and productivity, and possible effects on unique geological features that support special status plant species, if not protected. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on vegetation. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including vegetation, due to delays in reclamation or possible lack of funding or enforcement. These factors can increase risk of impacts due to surface water runoff and accelerated soil erosion which can lead to degraded plant communities and habitat within the project area. Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on vegetation in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on vegetation, compared to the existing condition. Previously permitted operations would continue with no change in effects. Benefits would accrue primarily from reduced risk to vegetation due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in removal of contaminated soils, effective erosion control, plugging and capping all nonproductive wells, maintaining areas of operations to avoid or minimize the cause of fire; recontouring and reestablishing native vegetative communities; controlling the invasion of exotic plant species; and overall proper site reclamation. This would result in reduced erosion and contaminated soil exposure, and a reduction in overall damage or loss of vegetation communities and special status plants compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on vegetation because NPS standards would apply inside and outside the parks, especially to plant species of special management concern. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts on vegetation in general within park boundaries following the removal of regulatory incentives to locate operations outside of the park units, although special status plant species would be avoided or protected through consultation. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to vegetation within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on vegetation, primarily from bringing previously exempt operations under regulation. Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Table 7. Summary of Environmental Consequences

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Wildlife and Aquatic Species (including animal species of special management concern)</p>	<p>Continuing impacts on wildlife and aquatic species and special-status species from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects could include loss or disruption of habitat due to vegetation and site clearing, habitat fragmentation, possible injury to or mortality of less mobile species, noise and associated species displacement or stress, and spills or releases of harmful substances. Plugging and reclamation of wells would result in long-term beneficial impacts on wildlife and aquatic species as a result of reclaiming the well pads and access roads of well sites. Impacts on wildlife and aquatic species and special-status species in the park units from directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including wildlife and aquatic species and special-status species, due to delays in reclamation or possible lack of funding or enforcement.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on wildlife and aquatic species and special-status species in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on wildlife and aquatic species and special-status species, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from reduced risk to wildlife due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on wildlife and aquatic species especially to animal species of special management concern, because NPS standards would apply inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries to wildlife in general following the removal of regulatory incentives to locate operations outside of the park units although special status species would be avoided or protected through consultation. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to wildlife within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on wildlife and habitat, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>
<p>Visitor Use and Experience (including</p>	<p>Continuing impacts on visitor use and experience from regulated and exempt operations would be expected, with an</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on visitor use and experience, compared to the</p>	<p>Impacts of the regulatory changes would also be primarily beneficial compared to the existing condition, although the change in regulation of directionally drilled</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>human health and safety, visitation patterns, visitor activities, recreation, interpretation)</p>	<p>increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects from these exempt operations would include possible exposure to contamination or safety hazards if sites are not cleaned up or properly secured, visual impacts of sites that may be exacerbated by site erosion and lack of adequate distance between sites and visitor use areas, noise impacts from equipment and crews, again due to the lack of setbacks as well as lack of equipment maintenance or muffling devices. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal effects on visitors. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site or if they can be seen or heard.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have effects on resources that in turn have effects on visitor use and experience. Thus, impacts on visitor use and experience would result from delays in proper reclamation or possible lack of funding or enforcement, which would increase the risk of sites being poorly maintained and free of debris or wastes.</p> <p>Cumulative impacts under the no-action alternative would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on visitor use and experience in the study area.</p>	<p>existing condition. These impacts would occur especially to those visitors who are disturbed by the presence and noise of wells in the parks.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from reduced risk to visitor use and experience due to previously exempt operations being subject to operating standards and mitigation as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in improved site appearance from erosion/sedimentation control, cleanup of spills, wastes and debris, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefit the visitors using and viewing those resources.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>wells could move noise and visual impacts closer to park visitors.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term indirect beneficial impacts visitors if better standards are applied to wells drilled on park boundaries. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to visitors within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefits the visitors that use or view those resources.</p> <p>The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on visitor use and experience, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Table 7. Summary of Environmental Consequences

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Scenic Views and Night Sky Resources</p>	<p>Continuing impacts on scenic views and night sky resources from regulated and exempt operations would be expected. Light pollution can impact human perception of the night sky, natural landscape, ecological processes and wildlife interactions. The risk of impacts of artificial lighting would be more severe or extensive from access-exempt or grandfathered sites. Adverse effects would include visual impacts of sites that may be exacerbated by site erosion and lack of adequate distance between sites and visitor use areas or intrusion of artificial lighting and flaring on night sky resources. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal effects on scenic views and the night sky. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site or if they can be seen. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have effects on resources that in turn have effects on the scenic views and night sky resources. Thus, impacts on scenic views and night sky resources would occur as a result of delays in proper reclamation or possible lack of funding or enforcement, which would increase the risk of sites being poorly maintained and free of debris or wastes. Cumulative impacts under the no-action alternative would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on scenic</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on scenic views and night sky resources, compared to the existing condition. Light pollution can impact human perception of the night sky, natural landscape, ecological processes and wildlife interactions. The impacts of artificial lighting have been documented at long distances. Previously permitted operations would continue with no change in effects. Benefits would accrue due to previously exempt operations being subject to operating standards and mitigation as opposed to no standards (access-exempt operations), or a standard of "immediate threat of significant injury" (grandfathered operations), as was the case under the existing condition. This would result in improved site appearance from erosion/sedimentation control, cleanup of spills, wastes and debris, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition. Keeping artificial lighting to a minimum and using directional shielded lighting would reduce impacts on night sky resources. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition and funding sources that could indirectly benefit resources at the parks, which indirectly benefit scenic views and night sky resources. Overall these regulatory improvements would result in long-term indirect beneficial impacts on scenic views and night sky resources compared to the existing condition. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly</p>	<p>Impacts of the regulatory changes would also be primarily beneficial compared to the existing condition although the change in regulation of directionally drilled wells could move visual impacts closer to the park units. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term indirect beneficial impacts on scenic views and especially night sky resources if better standards (e.g., reduced or shielded lighting requirements) are applied to wells drilled on park boundaries; however, regulating directional drilling could potentially result in a greater concentration of adverse impacts of having wells located within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to scenic views within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefits visual resources and night sky resources. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on scenic views and night sky resources, primarily from bringing previously exempt operations under regulation. Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
	views and night sky resources in the study area.	beneficial impacts to overall cumulative impacts from the change in regulations.	
Natural Soundscapes and Acoustic Environment	<p>Continuing impacts on soundscapes and the acoustic environment from regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects would include poorly maintained and noisy production equipment and lack of mitigating features (e.g., noise enclosures, noise barriers, relocation, equipment retrofits). Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on soundscapes and the acoustic environment. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks.</p> <p>The lack of penalties would result in less incentive for operators to meet NPS operating standards, such as installing mufflers or equipment with lower noise levels. This could result in more intense impacts on soundscapes and the acoustic environment.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on soundscapes and the acoustic environment in the study area.</p>	<p>Regulatory revisions would result primarily in long-term beneficial impacts on soundscapes and acoustic environment, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from the increased ability on the part of NPS to request and enforce the least damaging standard (as opposed to no standards) including proper maintenance of production equipment and placement of noise mitigation measures (e.g., mufflers, noise barriers, enclosures, retrofits, and quieter equipment). This would result in fewer noise and sound impacts compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands and resources, including soundscapes and the acoustic environment. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on soundscapes and the acoustic environment. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C could create additional long-term, direct adverse impacts to natural soundscapes within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on soundscapes and the acoustic environment, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Table 7. Summary of Environmental Consequences

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Cultural Resources (including archeological sites, prehistoric/historic structures, cultural landscapes, ethnographic resources)</p>	<p>Continuing impacts on cultural resources from both regulated and exempt operations would be expected, with an increased risk of more severe or extensive impacts near access-exempt or grandfathered sites. Adverse effects would include possible risks of the destruction of cultural resources or the degradation of their integrity and visual impacts of sites that may be exacerbated by site erosion and lack of adequate distance between sites and areas of intensive cultural resource presence. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal effects on cultural resources. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site or if they can be seen, thereby disrupting cultural landscapes.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have minimal indirect effects on cultural resources, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of having sites that are not maintained free of debris or wastes or properly reclaimed in a timely manner.</p> <p>Cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on cultural resources in the study area.</p>	<p>Regulatory revisions would result primarily in long-term indirect beneficial impacts on cultural resources, compared to the existing condition.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>Benefits would accrue primarily from reduced risk to cultural resources due to previously exempt operations being subject to “least damaging” and other operating standards and protocols for section 106 NHPA consultation as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. This would result in improved site appearance from erosion/sedimentation control, cleanup of spills, wastes and debris, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition.</p> <p>Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefit the visitors using and viewing those resources.</p> <p>When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations.</p>	<p>Impacts of the regulatory changes would also be primarily beneficial compared to the existing condition, although the change in regulation of directionally drilled wells could move some potential risks to cultural resources into parks that might otherwise be avoided.</p> <p>The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts because NPS standards would apply inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to cultural resources within park units compared to the existing condition. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit cultural resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on cultural resources, primarily from bringing previously exempt operations under regulation.</p> <p>Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.</p>

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Park Management and Operations</p>	<p>Current implementation practices among park resource specialists pertaining to the 9B regulations would continue and there would be no change in the administration of currently regulated and exempt operations. Thus, alternative A would result in no change to park management and operations. The costs to the NPS in terms of staff and resources of ensuring operational compliance with 9B requirements would continue under alternative A, and would result in long-term adverse impacts on park management and operations, although these impacts would be minimal.</p> <p>Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have the potential for additional administrative burden and expanded responsibilities placed upon NPS park resource specialists and would result in adverse effects to park operations and management.</p> <p>Alternative A would contribute only slightly to adverse cumulative impacts occurring to park management and operations as a result of cumulative plans and actions.</p>	<p>Under alternative B, the administration of the 9B regulations to previously exempt operations would require the use of park staff and resources, resulting in an increased administrative burden and adverse impacts on park management and operations compared to the existing condition. However, any additional responsibilities involved in addressing new operations would fall under the existing workload of dedicated park and central office resource protection specialists. Previously permitted operations would continue with no change in effects.</p> <p>However, provisions for cost recovery and compensation for access across federally owned lands would result in the potential for a reduced financial and administrative burden, resulting in long-term beneficial impacts on park management and operations. Additionally, any additional administrative responsibilities related to implementing the 9B regulations under alternative B would fall under the existing workload of dedicated park resource protection specialists and would not require additional full-time equivalent (FTE) or other administrative or material resources.</p> <p>Within the broader context of all cumulative plans and actions affecting park management and operations, implementation of alternative B would contribute a small but noticeable amount to adverse and beneficial cumulative impacts. Impacts would likely be greater to park operations for those units with a high number of current and/or exempt operations and for those units which exhibit a greater potential for future operations due, for instance, to their proximity to Marcellus shale.</p>	<p>Under alternative C, similar to alternative B, the additional administrative burden incurred from the application of 9B regulations to directionally drilled operations may result in direct adverse impacts on park management and operations when compared to the existing condition.</p> <p>The addition of directionally drilled operations that would previously have opted to locate outside of park boundaries but may now be located within the park would further contribute additional responsibilities involved in attending to new operations, and would increase the existing workload of dedicated park resource protection specialists but would not likely require additional FTE or other administrative or material resources. Any additional responsibilities involved in addressing new operations would fall under the existing workload of dedicated park and central office resource protection specialists. Provisions for cost recovery and compensation for access across federally owned lands would result in the potential for a reduced financial and administrative burden, resulting in long-term beneficial impacts on park management and operations. The potential degree of administrative burden would increase under alternative C, as both operations previously exempt from the 9B regulations as well as those operations utilizing directional drilling to access private minerals under the incentive to locate outside of the park administrative boundaries, would require the regulatory oversight of the NPS.</p> <p>The contribution to cumulative impacts of alternative C would be small but noticeable, given the wider context of cumulative actions affecting park management and operations.</p>

Table 7. Summary of Environmental Consequences

Impact Topic	Alternative A: No Action	Alternative B: Proposed Rule (Preferred Alternative)	Alternative C: Modified Proposed Rule
<p>Socio-economics (including non-federal oil and gas exploration and development, and regional and local economics)</p>	<p>There would be no change in effects on operator costs and local and regional economies from what is currently occurring. Implementation of the current 9B regulations on regulated operations is likely having adverse impacts on costs for operations in the seven category 1 park units, while exempt operations do not incur these regulatory costs. The no-action alternative would continue to have adverse effects on operator costs and financial viability for currently regulated operations into the foreseeable future. As wells come to the end of their productive life, there are additional plugging and reclamation costs anticipated to affect four operations per year, which could be considerable for operators as these costs can become economically significant as production declines and profit margins decrease.</p> <p>Financial assurance and financial liability requirements and enforcement and penalties would continue under current conditions, with no to minimal adverse impacts on most operator costs relative to overall operator costs, and no impacts on local and regional economies. Minimal compensation for access across federally owned lands would continue to benefit operator access costs.</p> <p>The contribution to cumulative impacts of the no-action alternative would be slight given the considerable oil and gas development occurring in the regions outside of park boundaries, additional federal, state, and local oil and gas permitting and operational requirements, and the many other cumulative actions affecting operator costs and local and regional economies.</p>	<p>Similar to alternative A, new operations under alternative B would have an incentive to locate their operations outside park boundaries (directionally drilling wells) to avoid NPS and other federal requirements, delays in permitting, and costs.</p> <p>Previously permitted operations would continue with no change in effects.</p> <p>New operations under alternative B, the same as experienced under existing conditions, would have possible considerable adverse effects to a few operators to comply with 9B permitting and development standards. Transfer of interest and financial liability of operators, compensation for federal access, and enforcement and penalties provisions under alternative B would have no to slight adverse impacts on operator costs and no noticeable impact on local and regional economies. Special use permits would allow the NPS to recover fees for processing permits and for park maintenance and other impacts. These fees would be expected to adversely affect costs to new operations, although these costs are small relative to the total costs of permitting, drilling, and completing wells.</p> <p>Cumulative actions, in combination with alternative B, could add to project costs affecting the viability of marginal and idle wells, resulting in additional plugging and reclamation of wells and major adverse impact to operators with multiple wells to plug and reclaim. The contribution to the cumulative impacts on local and regional economies of alternative B would be slight given the considerable oil and gas development and production occurring in adjacent regions and the many other cumulative actions affecting the local and regional economies.</p>	<p>Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.</p> <p>Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations if operations have “no effect on the federal interest.” Impacts on costs to operators would be similar as those described for alternative B, although slightly less, with small adverse effects on operator costs and project financial viability and no impacts on local and regional economies. Alternative C would require directionally drilled operations outside park boundaries to comply with 9B requirements, and adverse effects on compliance costs for these operations would also be incurred under alternative C. The incremental effect on operator costs per operation is assumed to be the same as those described under alternative B, with adverse effects on operator costs for permitting and meeting operating standards. Additionally, operators would not have the cost incentive to locate new operations outside of the park boundaries. As a result, there could be many new operations that would have been directionally drilled outside of the park boundary to access mineral resources now choosing to locate these wells within the park boundaries since the 9B compliance costs and delays would be incurred in either location.</p> <p>Under alternative C, the enforcement and penalties provision would be similar to alternative B, although the provision under alternative C would hold mineral owners and operators jointly and severally liable for obligations to comply with permit conditions and the regulations. The proposed penalty provisions are expected to motivate noncompliant operators, as well as mineral owners, to respond quickly to avoid penalties. Similar to alternative B, these enforcement penalties would have negligible adverse impacts on operator costs, project financial viability, or local and regional economies.</p> <p>The contribution to cumulative impacts of alternative C would be slight given the considerable oil and gas development occurring in the regions and the many other cumulative actions affecting the local and regional economies.</p>

ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

The following alternatives were brought forth by the planning team during the development of the proposed regulations or were suggested by the public in their comments on the Advanced Notice of Proposed Rulemaking or the Notice of Intent (NOI) to prepare this EIS. These alternatives or alternative components were considered but dismissed from further detailed analysis for reasons explained below.

EXEMPTING EXISTING OPERATIONS THAT ARE LOCATED ON NON-FEDERALLY OWNED LANDS WITHIN THE BOUNDARY OF THE PARK

One alternative considered but dismissed from further analysis would have included an exemption for existing operations that are located on non-federally owned lands within the boundary of the park. The existing 9B regulations already exercise regulatory jurisdiction over activities on private property. Therefore, by removing jurisdiction over operations occurring on private lands, this alternative would narrow the scope of the existing regulations and provide less protection of federally owned or administered lands, waters, or resources of park units, NPS visitor uses or experiences, or visitor or employee health or safety. This alternative was dismissed because it would be inconsistent with one of the objectives of the EIS and rulemaking – to eliminate 50 percent of exempt operations in an effort to better protect federally owned or administered lands, waters, or resources of park units, NPS visitor uses or experiences, or visitor or employee health or safety.

INCREASING THE BONDING CAP, ESTABLISHING MULTI-WELL BLANKET BOND, OR PLUGGING FUND AS ACCEPTABLE FINANCIAL ASSURANCE

A purpose and objective of the plan is to require adequate financial assurance from operators to ensure that adequate funds are available to properly reclaim operation sites in the event operators fail to fulfill their obligations under an approved plan of operations. The alternative of indexing the current bonding cap to inflation and updating this amount to reflect current and future dollar amounts builds off of the existing regulation at 9.48. However, this alternative fails to fully represent the true cost of reclamation leaving the public with the potential burden to pay for an operator's reclamation responsibilities. Therefore, this alternative does not meet the purpose and need for this regulatory revision and has been considered but dismissed. Similarly, the alternative of establishing a multi-well, servicewide blanket bond (similar to the blanket bond provisions in BLM's onshore oil and gas regulations) fails to capture the potential full cost of reclamation for multiple wells. Therefore this alternative does not meet the purpose and need for this regulatory revision. The alternative of establishing a plugging fund, such as those maintained by some states, supported by fees, penalties, and other payments collected from the operators would not be feasible for the NPS primarily because the NPS manages such a relatively small number of operator permits requests on a yearly basis. The amount of money that the NPS could realistically collect from operators would be minimal. In addition, the administrative burden on the NPS to maintain a plugging fund in relation to the small amounts of money that could be collected from operators does not justify this as a reasonable alternative and therefore has been considered but dismissed.

UNIFORM ACQUISITION OF OIL AND GAS RIGHTS IN ALL UNITS WHERE MINERAL DEVELOPMENT IS ONGOING OR LIKELY IN THE FUTURE

This alternative, which would have involved the purchase of private mineral rights, was deemed financially infeasible and unnecessary. The NPS has the authority to purchase the non-federal mineral rights on a case-by-case basis if needed, so purchasing all rights is not needed to provide protection of resources and values and human health and safety. Also, it would be cost prohibitive to purchase all of the

mineral rights where mineral development is ongoing or likely in the future. Therefore, this alternative was eliminated from further analysis.

It should be noted that NPS has never denied a plan of operations. In all cases where there would have been impacts on resources, plans have been developed to adequately mitigate adverse effects on federally owned or administered lands, waters, or resources of park units, NPS visitor uses or experiences, or visitor or employee health or safety. NPS regulations at 36 CFR 9B, governing non-federal oil and gas operations in park units, provide for reasonable controls on non-federal oil and gas exploration, production, and transportation to protect federally owned or administered lands, waters, or resources of national park system units, NPS visitor uses and experiences, or visitor and employee health and safety. Acquisition of all rights would be unnecessary to achieve these goals. In addition to financial infeasibility, in the event that there were unwilling sellers, this alternative would possibly require condemnation of mineral rights and would thus create substantial conflicts with private property rights. This would contradict provisions in the legislation at parks with private mineral reserves that permit prospecting and drilling for petroleum products and natural gas. This alternative would also be inconsistent with the objective of providing owners and operators of private oil and gas rights reasonable access for exploration, production, maintenance, and surface reclamation.

UNIFORM ACQUISITION OF ALL MINERAL RIGHTS IN PARK SYSTEM UNITS (RIGHTS OTHER THAN OIL AND GAS RIGHTS THAT FALL OUTSIDE OF 9B REGULATIONS)

For the same financial reasons discussed above, this alternative was dismissed from further analysis.

CONSISTENCY WITH THE PURPOSES OF THE NATIONAL ENVIRONMENTAL POLICY ACT

NEPA requires an analysis of how each alternative meets or achieves the purposes of the act, as stated in section 101(b). Each alternative analyzed in a NEPA document must be assessed as to how it meets the following purposes:

1. fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
3. attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. achieve a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities; and
6. enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

The CEQ has promulgated regulations for federal agencies' implementation of NEPA (40 CFR Parts 1500–1508). Section 1500.2 states that federal agencies shall, to the fullest extent possible, interpret and administer the policies, regulations, and public laws of the United States in accordance with the policies set forth in the act (sections 101(b) and 102(1)); therefore, other acts and NPS policies are referenced as applicable in the following discussion.

ALTERNATIVE A: NO ACTION

Alternative A would meet the purpose of NEPA to a small degree. The standard of least damaging methods currently applies to all nonexempt non-federal oil and gas operations on NPS lands. The NPS would continue to manage non-federal oil and gas operations that are currently operating under a plan of operations. By requiring plans of operations for new activities, this alternative would help to preserve, to some extent, important historic, cultural, and natural aspects of our national heritage, and would maintain an environment that supports diversity and variety of individual choice by allowing access to non-federal mineral rights (purpose 4). However, operations currently exempted from the 9B regulations governing non-federal oil and gas operations in park units would remain outside the scope of current regulations, and the standard of least damaging methods would not apply to these operations. Current and potential future impacts on public safety and park resources (e.g., impacts resulting from accidental spills and releases, or lack of full site reclamation) could result from exempt operations that are not required to meet the same standard that applies to nonexempt operations. Lack of NPS oversight in the form of inspections and monitoring for these exempt operations would not ensure healthful, productive, or aesthetically pleasing surroundings (purpose 2). As a result, alternative A would not attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences (purpose 3) or help to achieve a balance between population and resource use (purpose 5), nor would it enhance the quality of renewable resources (purpose 7). As a result, this alternative would only partially fulfill the responsibilities of each generation as the trustee of the environment for succeeding generations, and in preserving important aspects of our national heritage (purpose 1).

ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

This alternative would fulfill most of the purposes of NEPA to a moderate or large degree. Once the 9B rule revisions were promulgated, NPS would pursue operation permits for all new operations, including previously grandfathered and access-exempt operations. All operations would be required to meet the standard of least damaging methods which currently applies to all nonexempt operations. By requiring plans of operations for all new activities, this alternative would help preserve important historic, cultural, and natural aspects of our national heritage, and would maintain an environment that supports diversity and variety of individual choice by allowing access to non-federal mineral rights (purpose 4), enhance the quality of renewable resources (purpose 7), and help to ensure safe, healthful, productive, and esthetically pleasing surroundings (purposes 2 and 3). By providing for the fair compensation for new privileged access across federal lands outside the boundary of an operator's mineral right, alternative B would also help to achieve a balance between population and resource use (purpose 5). Overall, this alternative would go further than alternative A towards fulfilling the responsibilities of each generation, as a trustee of the environment, for succeeding generations (purpose 1).

ALTERNATIVE C: MODIFIED PROPOSED RULE

Similar to alternative B, this alternative would fulfill most of the purposes of NEPA to a moderate or large degree. Once the 9B rule revisions were promulgated, NPS would pursue operations permits for all new operations, including previously grandfathered and access-exempt operations. All operations would be required to meet the standard of least damaging methods, which currently applies to all nonexempt operations. By requiring plans of operations for all new activities, including surface and subsurface directional drilling operations outside the boundary of the park, alternative C would help preserve important historic, cultural, and natural aspects of our national heritage, and would maintain an environment that supports diversity and variety of individual choice by allowing access to non-federal mineral rights (purpose 4), enhance the quality of renewable resources (purpose 7), and help to ensure

safe, healthful, productive, and esthetically pleasing surroundings (purposes 2 and 3). However, the lack of incentives to locate operations outside park boundaries using directional drilling could result in less protection of important historic, cultural, and natural aspects of our national heritage. By providing for the fair compensation for new privileged access across federal lands outside the boundary of an operator's mineral right, alternative C would also help to achieve a balance between population and resource use (purpose 5). Like alternative B, this alternative would go further than alternative A toward fulfilling the responsibilities of each generation, as a trustee of the environment, for succeeding generations (purpose 1).

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The NPS typically identifies the environmentally preferable alternative in its NEPA documents for public review and comment. Guidance from the CEQ states that the environmentally preferable alternative means it is “the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources” (CEQ 1981). Alternative B (Proposed Rule) best meets this definition and is the environmentally preferable alternative.

NATIONAL PARK SERVICE PREFERRED ALTERNATIVE

To identify the preferred alternative, the planning team evaluated each alternative based on its ability to meet the objectives set forth for this rulemaking (table 6), considering potential impacts on the environment and on existing and future operations. Alternative B (Proposed Rule) was selected as the NPS preferred alternative.

Chapter 3
Affected Environment



CHAPTER 3: AFFECTED ENVIRONMENT

INTRODUCTION

The “affected environment” chapter describes existing conditions for those elements of the natural and cultural environments that would be affected by the implementation of the alternatives considered in this environmental impact statement (EIS). Impacts for each of the following topics are analyzed in “Chapter 4: Environmental Consequences.”

- Geology and soils (including paleontology)
- Air quality
- Water resources (including surface and groundwater, both quality and quantity)
- Wetlands
- Floodplains
- Vegetation (including plant species of special management concern)
- Wildlife and aquatic species (including animal species of special management concern)
- Visitor use and experience (including human health and safety, visitation patterns, visitor activities, recreation, interpretation)
- Scenic views and night sky resources
- Natural soundscapes and acoustic environment
- Cultural resources (including archeological sites, prehistoric/historic structures, cultural landscapes, ethnographic resources)
- Park management and operations
- Socioeconomics (including non-federal oil and gas exploration and development, and regional and local economies)

The availability of data and information on these topics varies across the park units discussed in this EIS. Moreover, the uniqueness of the natural and cultural environments in individual park units presents an obstacle to the level of detail with which these topics can be addressed programmatically. For this reason, background information is presented in tabular form throughout much of the following discussion in order to present the reader with a broad, context-based understanding of the types of resources within each of the park units that may be affected by the proposed rule and EIS.

There currently are oil and gas operations in several national park system units that are not subject to the plan of operations and performance bonding requirements of the 9B regulations. For instance, grandfathered operations, while still subject to the “imminent threat of significant injury” standard, are subject to much lower operating standards than operations permitted under the regulations. The park units with exempt operations are as follows:

- Big South Fork National River and Recreation Area
- Obed Wild and Scenic River

- Aztec Ruins National Monument
- Big Thicket National Preserve
- Cuyahoga Valley National Park
- New River Gorge National River
- Lake Meredith National Recreation Area
- Cumberland Gap National Historic Park
- Gauley River National Recreation Area

In order to provide a greater level of detail in reporting resources that would be potentially affected by changes in the regulatory status of this category of operations, the resources near active oil and gas operations at these park units are analyzed at a site-specific level of detail in chapter 4 of this EIS. Site-specific information about resources at or near exempt wells was gathered from geographic information system (GIS) data or inspection reports that were provided by the parks. This information is summarized in tables in appendices C and D and used where possible in the analyses in chapter 4. In instances where further actions are proposed for facilities at these park units, additional site-specific information would supplement any subsequent environmental analysis needed in accordance with the NPS National Environmental Policy Act (NEPA) planning and decision-making process.

EFFECTS OF CLIMATE CHANGE ON NATIONAL PARK SYSTEM UNITS

Climate change refers to a suite of changes occurring in the earth's atmospheric, hydrologic, and oceanic systems. These changes, including increased global air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level, provide evidence that the climate system is warming (IPCC 2007). While the warming trend, commonly referred to as global warming, is discernible over the entire past century and a half, recent decades have exhibited an accelerated warming rate with 11 of the last 12 years ranking among the 12 warmest years on record. As climate changes, changes in weather conditions will impact the natural environment of national park system units by shifting patterns of precipitation, promoting extremes in storm behavior, altering seasonal temperatures, and influencing the triggers for bird migration, wildlife breeding, insect emergence, and plant dormancy.

Some national park system units are already seeing changes to vegetation and wildlife habitat and water resources as a result of climate change, and research predicts that many parks will see changes to these resources in upcoming decades (NPS 2009). For example, according to the climate change brief for the park units in the Appalachian Highlands network (NPS 2010b), a major issue for Big South Fork National River and Recreation Area and Obed Wild and Scenic River is water supply, and droughts are of concern regarding potential effects on vegetation communities and aquatic fauna. These two parks contain the best remaining examples of a globally imperiled river scour prairie grassland community, the Cumberland cobble, which is dependent upon scouring floods for survival of the community. Extended droughts or any significant disruption of groundwater flow could exterminate this community and affect other vegetation and wildlife dependent on this habitat. Vegetation and wildlife in other category 1 and 2 park units are also currently subject to the effects of changing climate and similar factors related to species viability. Changing patterns in precipitation and temperature have the potential to shift the latitudinal and elevational distribution of some plant communities and threaten the persistence of others.

Climate change can also result in sea level rise and increased frequency and intensity of storm events (IPCC 2013). Climate change could raise sea levels in coastal parks containing oil and gas resources, such

as Padre Island National Seashore, and increase flooding along rivers such as found at Big Thicket National Preserve, which has wells in and around the Neches River floodplain. Habitat potentially lost due to sea level rise includes beaches and wetlands that surround the landward boundaries of the parks. Storm events also have the potential to cause substantial land and habitat loss by exacerbating erosion rates and changing hydrologic and sediment dynamics. As temperature and precipitation patterns affect the abundance, type, and distribution of vegetation cover in watersheds, changes in flood magnitude and duration, sediment loads, and water chemistry will likely occur.

Climate change will alter park ecosystems in fundamental ways, which will vary depending on park locations and resources. The effect of climate change on many of the resources discussed in this draft EIS is recognized and will continue to be evaluated, as new science becomes available and the future of climate change unfolds.

GEOLOGY AND SOILS

The 42 category 1 and 2 park units are within a total of 9 physiographic provinces. The type and distribution of geologic features vary widely across the multiple units in the national park system, and the extent to which unique soil types are present can be vastly different between two park units located within the same physiographic province. A description of each of the 9 physiographic provinces associated with the category 1 and 2 park units follows. These descriptions are derived from Kiver and Harris (1999) unless otherwise noted. Table 8 (later in this section) lists category 1 and 2 park units and the physiographic regions within which they are located.

APPALACHIAN PLATEAUS PROVINCE

The Appalachian Plateaus province encompasses many of the parks covered in this EIS. It extends from Alabama to beyond the glacial border in Ohio and Pennsylvania and is bounded on all sides by escarpments, giving the plateau an overall synclinal (trough like) structure. Most rocks found in this province are clastic sedimentary rocks (i.e., made fragments of older rocks). They include conglomerates, sandstones, and shales, with some interbedded coal. Limestones are uncommon. Strata are mainly Mississippian (359–323 million years old) and Pennsylvanian age (323–299 million years old), although some northern areas are underlain by younger Permian age rocks (299–252 million years old) (FEN 2008).

CENTRAL LOWLANDS PROVINCE

The Central Lowlands province is the largest geomorphic province in the United States, covering the north-central portion from just east of the Great Lakes west to the Great Plains in the Dakotas. The Central Lowlands are part of the stable continental interior, an area where only minor deformation of the sediments and rocks has occurred since Precambrian time. The geologic structures characteristic of this region are broad uplifts and basins filled with gently dipping sedimentary rocks on its flanks. Indiana Dunes National Lakeshore, a category 2 park is found in this region and has distinct geologic features that are the result of the erosion of Pleistocene-age glacial sediments (2.6–0.01 million years old).

INTERIOR LOW PLATEAUS PROVINCE

The Interior Low Plateaus province is characterized by geologic structures similar to those of the Central Lowlands. This province is at the southeastern edge of the stable continental interior and lies between the Central Lowlands on the northwest, the Mississippi embayment part of the Coastal Plain province on the southwest, and the Cumberland Escarpment at the edge of the Appalachian Plateaus province to the east.

COASTAL PLAIN PROVINCE

The Coastal Plain province consists of the seaward-sloping, lowland sediments along the Atlantic Ocean and Gulf of Mexico and the submerged section, the continental shelf. Rocks of the Coastal Plain province fall into one of three groups. Around the inner border of the province are marine sedimentary rocks deposited when the Cretaceous sea (145–66 million years old) inundated this part of the continent. In the middle section of the province, younger marine, Tertiary-age (66–29 million years old) rocks overlie the Cretaceous rocks and dip gently towards the sea. Along the coastal areas, sediments of Quaternary age (2.6–0.01 million years old) form a more or less continuous band of varying width from southern Texas to Long Island.

COLORADO PLATEAUS PROVINCE

The Colorado Plateaus province has the highest concentration of parklands in the national park system. The region is mostly arid or semiarid and is largely devoid of vegetation and thick soils that obscure the geologic record in other areas of the country. In addition to extensive flat-topped plateaus, other major landforms in the province include canyons produced by the Colorado River and its tributaries, colorful exposed sedimentary rocks, plateau edges and basins localized by fault scarps and folds, igneous mountains produced by both intrusive and extrusive geologic processes, and lava fields.

GREAT PLAINS PROVINCE

The Great Plains province is characterized by extensive low-relief topography with some localized mountains and volcanic deposits near its western edge. Running water has eroded the sediments and formed the colorful badland topography at Theodore Roosevelt National Park, which also contains Tertiary-age sedimentary debris shed from erosion of the Rocky Mountains.

MIDDLE ROCKY MOUNTAINS PROVINCE

The Middle Rocky Mountain Province is made up of the mountains, plateaus, and basins of western Wyoming, northeastern Utah, and a small portion of Montana and northwest Colorado. In this province, overlying Paleozoic (541–252 million years old) and younger Mesozoic (252–66 million years old) sedimentary rocks over 20,000 feet thick are exposed along the flanks of the folded and thrust faulted mountain ranges of the Uintas, Beartooths, and central Wyoming.

PACIFIC BORDER PROVINCES

The Pacific Border provinces extend from the tip of the Aleutian Islands chain southeastward through California, and include four major tectonic components, one of which is the California San Andreas transform fault system. A major feature of the Santa Monica Mountains National Recreation Area is the Santa Monica Mountain chain, which is the southernmost mountain chain in the east-west trending, or transverse ranges of southern California. This province is characterized by active geologic processes at the continental and oceanic plate boundaries (mountain-building and volcanism).

SOUTHERN ROCKY MOUNTAINS PROVINCE

This province contains broad anticlinal uplifts (rocks folded during mountain building episodes) with thrust faults on one or both flanks that formed during the late Mesozoic - early Tertiary Laramide orogeny approximately 70 to 40 million years ago. Great Sand Dunes National Park and Preserve (category 2

park) represents the only true desert in the southern Rocky Mountains and lies along the east edge of the San Luis Valley within the Southern Rocky Mountains physiographic province.

GEOLOGICALLY IMPORTANT PARK RESOURCES

Nine of the 42 category 1 and 2 park units were established primarily for the importance of their geologic resources. These nine park units are Big South Fork National River and Recreation Area; Carlsbad Caverns National Park; Dinosaur National Monument; Gauley River National Recreation Area; Great Sand Dunes National Park and Preserve; Guadalupe Mountains National Park; Santa Monica Mountains National Recreation Area; Mammoth Cave National Park, and Theodore Roosevelt National Park.

UNIQUE GEOLOGICAL FEATURES

Some park units have unique geological features such as caves (Carlsbad Caverns National Park), sand mounds (Big Thicket National Preserve), and filled chimneys (Lake Meredith National Recreation area). Where data were available, these resources were mapped and compared to the locations of exempt operations. Results are included in appendix C.

SOILS IN NATIONAL PARK SYSTEM UNITS

Major soils associations occurring in the vicinity of the park units addressed in this draft EIS are listed in table 8.

TABLE 8. PHYSIOGRAPHIC PROVINCES AND MAJOR SOIL ASSOCIATIONS OF CATEGORY 1 AND 2 PARK UNITS

Park Unit	Physiographic Province	Major Soil Associations
Category 1 Park Units		
Alibates Flint Quarries National Monument	Great Plains	Glenrio-Burson-Aspermont
Aztec Ruins National Monument	Colorado Plateaus	Stumble-Saido-Blancot-Badland
Big Cypress National Preserve	Coastal Plain	Wabasso-Terra Ceia-Pineda-EauGallie-Demory-Boca
Big South Fork National River and Recreation Area	Appalachian Plateaus	Ramsey-Muskingum-Lonewood-Lily
Big Thicket National Preserve	Coastal Plain	Pinetucky-Doucette
Cumberland Gap National Historic Park	Appalachian Plateaus	Ramsey-Muskingum-Lonewood-Lily
Cuyahoga Valley National Park	Appalachian Plateaus	Mahoning-Ellsworth
Gauley River National Recreation Area	Appalachian Plateaus	Pineville-Gilpin-Dekalb-Buchanan
Lake Meredith National Recreation Area	Great Plains	Veal-Tascosa-Mobeetie
New River Gorge National River	Appalachian Plateaus	Rock outcrop-Gilpin-Dekalb
Obed Wild and Scenic River	Appalachian Plateaus	Ramsey-Muskingum-Lonewood-Lily
Padre Island National Seashore	Coastal Plain	Mustang-Galveston-Coastal dunes

Park Unit	Physiographic Province	Major Soil Associations
Category 2 Park Units		
Bluestone National Scenic River	Appalachian Plateaus	Shouns-Gilpin-Cateache-Berks
Cane River Creole National Historical Park	Coastal Plain	Roxana-Norwood-Gallion
Carlsbad Caverns National Park	Great Plains	Tencee-Rock outcrop-Reakor-Ector
Dinosaur National Monument	Middle Rocky Mountains	Winona-Travessilla-Schooner-Rock outcrop-Rentsac-Duffymont-Crago
Everglades National Park	Coastal Plain	Water-Terra Ceia-Perrine-Pennsuco-Okeelanta
Flight 93 National Memorial	Appalachian Plateaus	Wharton-Rayne-Gilpin-Ernest-Cavode
Fort Necessity National Battlefield	Appalachian Plateaus	Wharton-Rayne-Gilpin-Ernest-Cavode
Fort Union Trading Post National Historic Site	Great Plains	Trembles-Lohler-Havrelon
Friendship Hill National Historic Site	Appalachian Plateaus	Guernsey-Dormont-Culleoka
Glen Canyon National Recreation Area	Colorado Plateaus	Nakai-Limeridge-Bluechief
Grand Teton National Park	Middle Rocky Mountains	Rhylow-Oleo-Lasac-Koffgo-Dashiki
Great Sand Dunes National Park and Preserve	Southern Rocky Mountains	Leadville-Lakehelen-Granile
Guadalupe Mountains National Park	Basin and Range / Great Plains	Tome-Tencee-Reakor-Lozier
Gulf Islands National Seashore	Coastal Plain	Smithton-Plummer-Harleston-Atmore
Hopewell Culture National Historical Park	Central Lowlands	Sleeth-Ockley-Eldean
Indiana Dunes National Lakeshore	Central Lowlands	Riddles-Oshtemo-Crosier
Jean Lafitte National Historic Park and Preserve	Coastal Plain	Mowata-Crowley
Johnstown Flood National Memorial	Appalachian Plateaus	Philo-Monongahela-Atkins
Little River Canyon National Preserve	Appalachian Plateaus	Townley-Nauvoo-Hartsells-Gorgas
Mammoth Cave National Park	Interior Low Plateaus	Zanesville-Wellston-Frondorf
Mesa Verde National Park	Colorado Plateaus	Zyme-Sili
Nicodemus National Historic Site	Great Plains	Uly-Penden-Holdrege
Palo Alto Battlefield National Historic Site	Coastal Plain	Olmito-Laredo-Cameron
San Antonio Missions National Historical Park	Coastal Plain	Sunev-Lewisville-Divot-Atco
Sand Creek Massacre National Historic Site	Great Plains	Valent-Wiley-Bankard-Glenberg
Santa Monica Mountains National Recreation Area	Pacific Border	Rock outcrop-Lithic Xerorthents-Calleguas-Badland
Steamtown National Historic Site	Appalachian Plateaus	Wellsboro-Oquaga-Morris-Lackawanna
Theodore Roosevelt National Park	Great Plains	Fleak-Cherry-Cabbart-Badland
Upper Delaware Scenic and Recreational River	Appalachian Plateaus	Vly-Oquaga-Lackawanna
Washita Battlefield National Historic Site	Central Lowlands	Yahola-Lincoln-Dale-Crisfield-Clairemont

Sources: USDA 2008; NPS I&M Network plans and appendices; NPS oil and gas management plans and general management plans (GMPs), where available.

Soil types found at exempt well locations are identified in appendix C.

Prime Farmland Soils

The Farmland Protection Policy Act was passed to minimize the amount of land irreversibly converted from farmland due to federal actions. Prime farmland, as defined by the U.S. Department of Agriculture Natural Resources Conservation Service, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable for cultivation. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. Slopes typically range from 0 to 3 percent, but may range to 8 percent (NRCS 2008).

Prime farmland soils are known to exist at several of the park units that are classified as category 1 or 2 parks. These park units include, among others, Big Cypress National Preserve, Padre Island National Seashore, and Big South Fork National River and Recreation Area.

AIR QUALITY

Air quality within national parks is protected under several provisions of the Clean Air Act, including the prevention of significant deterioration (PSD) program and the national ambient air quality standards (NAAQS). Additionally, U.S. Environmental Protection Agency (USEPA) issued final amendments to its July 1999 regional haze rule on June 15, 2005. These amendments apply to the provisions of the regional haze rule that require emission controls known as Best Available Retrofit Technology, or BART, for industrial facilities emitting air pollutants that reduce visibility.

The USEPA PSD program determines the maximum allowable increases in concentrations of sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and particulate matter over 10 microns (PM₁₀) emitted by new or modified major sources in the area of park units. The program applies to defined categories of new or modified sources of air pollution with emissions greater than 100 tons per year and all other sources greater than 250 tons per year. Emissions from pollution sources affecting the park units are considered on a project-by-project basis in the assessment of air quality impacts allowed under the PSD increment system. The program also includes protections against exceedences of the NAAQS. Of particular importance for resources in national park system units, provisions of the PSD program also protect air quality related values, such as visibility and nitrogen and sulfur deposition, in the class I areas, which are described below.

National park system units designated as class I areas (the most protective designation) under the PSD program include the following category 2 park units:

- Guadalupe Mountains National Park
- Mammoth Cave National Park
- Grand Teton National Park
- Theodore Roosevelt National Park
- Great Sand Dunes National Park and Preserve

- Everglades National Park
- Mesa Verde National Park

The remaining park units are designated class II areas.

The USEPA has set NAAQS for six principal pollutants, which are called “criteria” pollutants. These criteria pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide. The NAAQS represent the minimum standards for these air pollutants throughout the country. The Clean Air Act identifies two types of NAAQS. Primary standards provide public health protection, including protecting the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. These standards are presented in table 9. Table 10 identifies the park units located in counties where the number of reported exceedances of these pollutants have resulted in the designation of nonattainment status.

TABLE 9. NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Standard	Averaging Period	Metric	Threshold for Nonattainment
Carbon monoxide	Primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	Not to be exceeded
Lead (Pb)	Primary and Secondary	Rolling 3-month Average	0.15 µg/m ³	98th percentile, averaged over 3 years
Nitrogen dioxide	Primary	1-hour	100 ppb	Annual Mean
	Primary and Secondary	Annual	53 ppb	
Ozone (O ₃)	Primary and Secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate matter of 2.5 micron particle size (PM _{2.5})	Primary	Annual	12 µg/m ³	annual mean, averaged over 3 years
	Secondary	Annual	15 µg/m ³	annual mean, averaged over 3 years
	Primary and Secondary	24-hour	35 µg/m ³	98th percentile, averaged over 3 years
Particulate matter of 10 micron particle size (PM ₁₀)	Primary and Secondary	24-hour	150 µg/m ³	Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide (SO ₂)	Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: USEPA 2013a.

TABLE 10. CATEGORY 1 AND 2 PARK UNITS IN DESIGNATED NONATTAINMENT AREAS*

Park Unit	PSD Class	County	NAAQS Nonattainment Area	Pollutant(s)
Category 1 Park Units				
Big Thicket National Preserve	II	Liberty	Houston-Galveston-Brazoria	O ₃
Cuyahoga Valley National Park	II	Cuyahoga, Summit	Cleveland-Akron-Lorain	Pb, O ₃ , PM _{2.5}
Category 2 Park Units				
Fort Necessity National Battlefield	II	Fayette	Pittsburgh-Beaver Valley	O ₃
Indiana Dunes National Lakeshore	II	Lake, Porter	Chicago-Naperville	O ₃
Johnstown Flood National Memorial	II	Cambria	Johnstown, PA	PM _{2.5}
Santa Monica Mountains National Recreation Area	II	Ventura, Los Angeles	Los Angeles County-South Coast Air Basin	Pb, O ₃ , PM _{2.5}
Upper Delaware Scenic and Recreational River	II	Delaware	Philadelphia-Wilmington-Atlantic City	O ₃ , PM _{2.5}

Source: USEPA 2013b.

* Nonattainment status is reported as of 2013. Note that while the designation of nonattainment may have been made in prior years, counties listed here have not reduced ambient concentrations to levels that would allow redesignation to attainment status.

WATER RESOURCES

Water resources refer to surface waters such as lakes, rivers, ponds, streams, and springs, as well as underground aquifers and seeps. Almost every national park system unit has water resources within its designated boundary. In many cases, the water resources contained within park units constitute one of the reasons for which the park was established. For example, many park units were established for the preservation of important aquatic resources and/or water-based recreation. Moreover, many park units have congressionally designated wild and scenic rivers or other outstanding natural resource waters as designated by each state. Park units with water resources designated as outstanding natural resource waters status require that no activities may be permitted if they would result in lower water quality than already exists in the affected waters of the park unit.

Table 11 provides information about water resources at each of the category 1 and 2 park units. The park unit-specific information was compiled from information provided in NPS documentation and acquired through communication with park resource personnel. Although the resources listed here do not reflect an exhaustive inventory of every water resource within each of the park units, the list provides a representative sample of water resources within each park unit and indicates whether those water resources constitute wild and scenic rivers or outstanding natural resource waters. Site-specific information about distance to nearest water bodies is provided in appendix C.

TABLE 11. WATER RESOURCES OF CATEGORY 1 AND 2 PARK UNITS

Park Unit	Selected Water Resources	Wild and Scenic Rivers? (Y/N)	Outstanding Natural Resource Waters? (Y/N)
Category 1 Park Units			
Alibates Flint Quarries National Monument	Canadian River (intermittent flows)	N	N
Aztec Ruins National Monument	Tributaries of the Animas River, Farmers Ditch	N	N
Big Cypress National Preserve	Big Cypress Swamp	N	Y
Big South Fork National River and Recreation Area	Big South Fork of the Cumberland River, Clear Fork and New River, Lake Cumberland backwaters, streams	N	Y
Big Thicket National Preserve	Neches River, Pine Island Bayou, Little Pine Island Bayou, Turkey Creek, Menard Creek, Big Sandy Creek, Village Creek	N	N
Cumberland Gap National Historic Park	Little Yellow Creek, Sugar Run, Shillalah Creek, Martins Fork, Station Creek, Davis Branch and Gap Creek	N	N
Cuyahoga Valley National Park	Cuyahoga River, Tinkers Creek, Brandywine Creek, Chippewa Creek, Furnace Run, Indigo Lake, Kendall Lake, Goosefeather pond, Armington pond	N	Y
Gauley River National Recreation Area	Gauley River, Meadow River, 1st through 3rd order streams	N	N
Lake Meredith National Recreation Area	Lake Meredith, Canadian River, several small streams and ponds	N	N
New River Gorge National River	New River, portions of 77 tributaries	N	N
Obed Wild and Scenic River	Obed River, Emory River, Daddy's Creek, Clear Creek	Y	Y
Padre Island National Seashore	Gulf of Mexico, Laguna Madre, shallow fresh or brackish water ponds	N	N
Category 2 Park Units			
Bluestone National Scenic River	Bluestone River	Y	N
Cane River Creole National Historical Park	Cane River and the edge of Cane River Lake	N	N
Carlsbad Caverns National Park	Rattlesnake Springs, multiple permanent and intermittent seeps and springs	N	N
Dinosaur National Monument	Green River, Yampa River, perennial and intermittent streams	N	N
Everglades National Park	Florida Bay, Northeast Shark River Slough	N	Y
Flight 93 National Memorial	None	N	N
Fort Necessity National Battlefield	Perennial streams: Great Meadow Run, Indian Run, Braddock Run, five ponds, intermittent streams and vernal pools	N	N
Fort Union Trading Post National Historic Site	Missouri River	N	N

Park Unit	Selected Water Resources	Wild and Scenic Rivers? (Y/N)	Outstanding Natural Resource Waters? (Y/N)
Friendship Hill National Historic Site	Tributaries of the Monongahela River, ponds	N	N
Glen Canyon National Recreation Area	Colorado River, San Juan River, Dirty Devil River, Escalante River, Lake Powell, perennial streams, ephemeral drainages, over 600 springs and seeps	N	N
Grand Teton National Park	Snake River, Gros Ventre River, Jackson Lake, over 100 alpine lakes	N	Y
Great Sand Dunes National Park and Preserve	Big Spring Creek, Little Spring Creek, Medano Creek, Sand Creek, sandbed streams, alpine lakes	N	N
Guadalupe Mountains National Park	McKittrick Creek, Choza stream and springs, multiple springs, seeps, and ephemeral washes	N	N
Gulf Islands National Seashore	Mississippi Sound, Big Lagoon, Pensacola Bay, Choctawhatchee Bay	N	N
Hopewell Culture National Historical Park	Scioto River	N	Y
Indiana Dunes National Lakeshore	Lake Michigan, Grand Calumet River, Little Calumet River, Long Lake, Salt Creek	N	Y
Jean Lafitte National Historic Park and Preserve	Mississippi River delta, Bayou Segnette Waterway, bayous, ponds, and estuarine lakes	N	N
Johnstown Flood National Memorial	Little Conemaugh River	N	N
Little River Canyon National Preserve	Little River	N	N
Mammoth Cave National Park	Green River, Nolin River, Bylew Creek, Second Creek, cave streams, isolated sinkhole ponds, springs	Y	Y
Mesa Verde National Park	Mancos River, over 300 surface water sites including cliff base springs, drainage springs, and potholes	N	N
Nicodemus National Historic Site	None	N	N
Palo Alto Battlefield National Historic Site	Abandoned distributary channels of the Resaca de Palo Alto of the Rio Grande Delta	N	N
San Antonio Missions National Historical Park	San Antonio River	N	N
Sand Creek Massacre National Historic Site	Big Sandy Creek	N	N
Santa Monica Mountains National Recreation Area	Pacific Ocean, Malibou Lake, Malibou Creek, Century Lake, Mugu Lagoon, multiple intermittent streams and springs	N	N
Steamtown National Historic Site	None	N	N
Theodore Roosevelt National Park	Little Missouri River, Paddock Creek, Jones Creek, Jules Creek, Knutson Creek, multiple perennial and intermittent streams	N	N

Park Unit	Selected Water Resources	Wild and Scenic Rivers? (Y/N)	Outstanding Natural Resource Waters? (Y/N)
Upper Delaware Scenic Recreational River	Upper Delaware River, tributaries	Y	N
Washita Battlefield National Historic Site	Washita River	N	N

Sources: Correspondence with park resource specialists; NPS I&M Network plans and appendices; and oil and gas management plans and GMPs, where available.

WATER QUALITY

Water quality monitoring is occurring in each park unit to provide park staff with the ability to assess and manage water quality issues within regulated water bodies in the park unit. If monitoring and assessment indicates that a waterbody or segment is not meeting state water quality standards for certain designated uses or parameters, that water is considered “impaired.” That water body is then added to the 303(d) list of impaired water bodies, named after the section of the Clean Water Act that requires states, approved tribes, and territories to create and maintain such lists. The 303(d) list includes not only currently impaired waterbodies, but also waters believed to be threatened and which are likely to become impaired.

Table 12 lists each of the category 1 and 2 park units that have impaired waters listed on the 303(d) list, as well as associated problem parameters and causes pertaining to the listing. Twenty-four of the 42 category 1 and 2 parks within the national park system have at least one 303(d) impaired waterbody. Of the park units with impaired waters, 10 category 1, and 14 category 2 park units have 303(d) impaired waters. Among each of the category 1 and 2 park units, water quality and associated impairments vary considerably. Many of the parks cite oil and gas and other mineral development as a cause for degraded water quality. These parks include, but are not limited to, Big Thicket National Preserve, Big South Fork National River and Recreation Area, Gauley River National Recreation River, and Aztec Ruins National Monument.

TABLE 12. 303(D) IMPAIRED WATERS WITHIN CATEGORY 1 AND 2 PARK UNITS

Park Unit	Impaired Waters	Problem Parameters and Causes
Category 1 Park Units		
Aztec Ruins National Monument	Adjacent Animas River	Sedimentation and temperature. Causes thought to be resource extraction, urban runoff, petroleum activities, and agriculture.
Big South Fork National River and Recreation Area	Pine Creek, Bear Creek, Roaring Paunch Creek, Rock Creek	Mercury, siltation, low dissolved oxygen, organic enrichment, sediment toxicity, contaminated mine drainage, low pH. Causes thought to be oil and gas development and mine drainage.
Big Thicket National Preserve	Segment 607 (Pine Island Bayou), Segment 608 (Village Creek)	High metal content, low pH. Causes thought to be logging and oil and gas operations.
Cumberland Gap National Historic Park	Gap Creek	High levels of e. coli.
Cuyahoga Valley National Park	Cuyahoga River, Brandywine Creek, Tinkers Creek, Chippewa Creek	Organic enrichment and ammonia.

Park Unit	Impaired Waters	Problem Parameters and Causes
Gauley River National Recreation Area	Gauley River, Meadow River, Peter's Creek	Aluminum, fecal coliform, iron, manganese. Causes thought to be abandoned mine drainage.
Lake Meredith National Recreation Area	Lake Meredith	Mercury in fish tissue from atmospheric deposition.
New River Gorge National River	14 streams	Aluminum, fecal coliform, iron, manganese, pH. Causes are mine drainage and unknown causes.
Obed Wild and Scenic River	Obed River, Clear Creek	Siltation, oil and related contaminants.
Padre Island National Seashore	Lagoons and shallow bays	Low dissolved oxygen, excessive algal growth, and excess nutrient levels.
Category 2 Park Units		
Bluestone National Scenic River	3 streams	Fecal coliform, cause known.
Carlsbad Caverns National Park	Upper Pecos-Black Basin	Unknown cause.
Everglades National Park	Southeast and Southwest Coasts of FL, Southwest Gulf Coast	High mercury levels in fish, high bacteria levels in shell fish.
Glen Canyon National Recreation Area	Paria River, Lake Powell, Colorado River	Suspended sediments and possible turbidity. Lake Powell and Colorado River on planning list due to incomplete data (e. coli and core parameters).
Gulf Islands National Seashore	Mississippi Sound, Big Lagoon, Pensacola Bay, Choctawhatchee Bay	Arsenic, pH, toxics, dissolved oxygen, fecal coliforms, mercury, total suspended solids.
Hopewell Culture National Historical Park	Scioto River	Organics
Indiana Dunes National Lakeshore	Lake Michigan, Grand Calumet River, Little Calumet River	Polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), metals, pesticides, fuels and oils, indicator bacteria, biota. Causes include industrial/municipal effluent, surface runoff, altered hydrologic processes.
Jean Lafitte National Historic Park and Preserve	Bayou Segnette Waterway	Organic enrichment, low dissolved oxygen.
Johnstown Flood National Memorial	Little Conemaugh	Abandoned mine drainage (metals, pH).
Mammoth Cave National Park	Green River	Excessive fecal coliform bacteria.
San Antonio Missions National Historical Park	San Antonio River	High nutrients (nitrate, nitrite), high bacterial levels for contact recreation.
Santa Monica Mountains National Recreation Area	17 water bodies (lakes, creeks, and Malibu Lagoon)	Selenium, algae, organic enrichment, high coliform, lead, mercury, low dissolved oxygen, trash.
Theodore Roosevelt National Park	Little Missouri River	Occasional high levels of chloroform.
Upper Delaware Scenic Recreational River	Upper Delaware River	Mercury and PCB, cause unknown but suspected nonpoint source pollution.

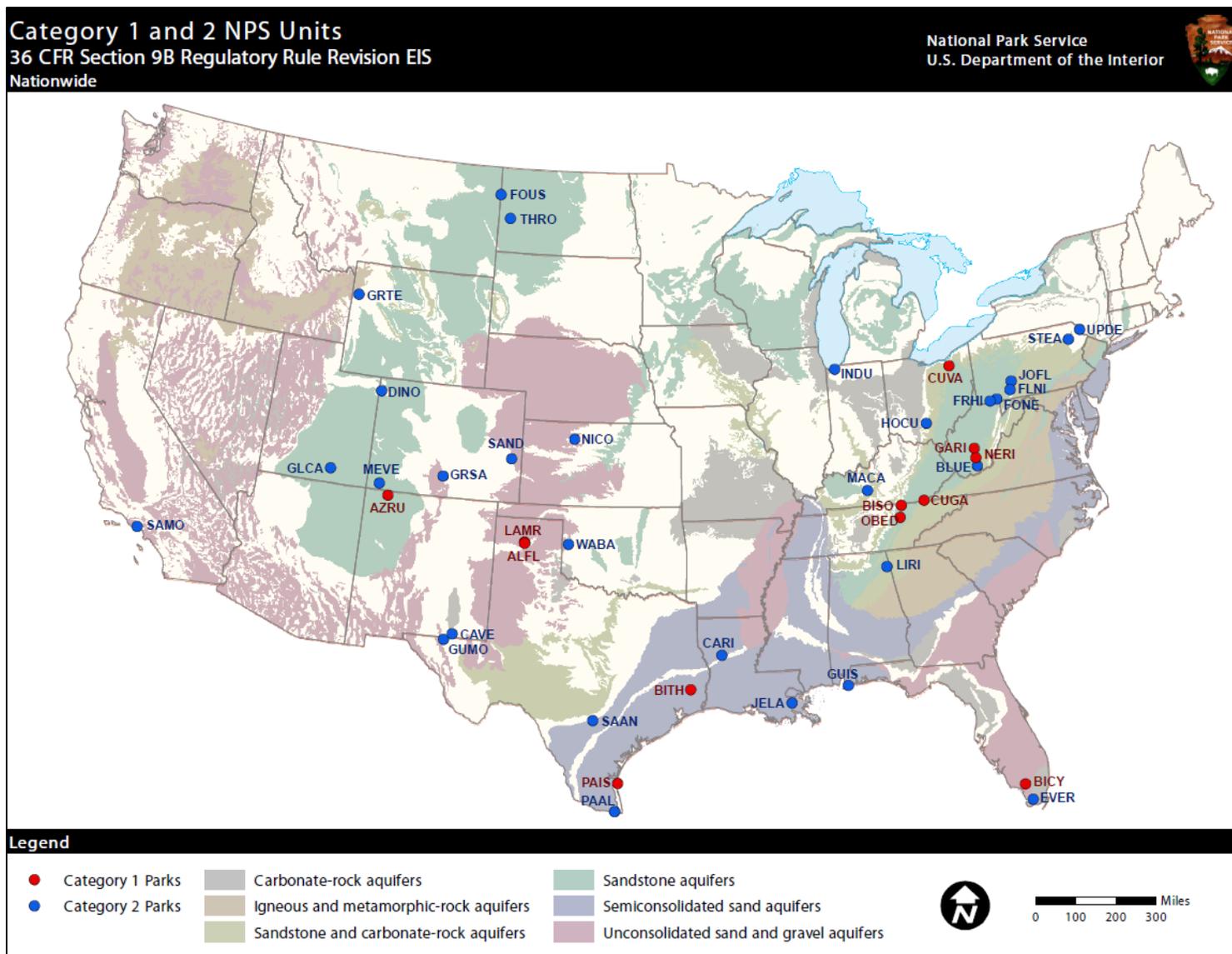
Source: Correspondence with park resource specialists.

GROUNDWATER

Groundwater is water located beneath the ground surface in soil pore spaces and in the fractures of rock formations. When a unit of rock or sediment can yield a usable quantity of water, it is called an aquifer. Aquifers are also able to transmit groundwater via the relatively porous substrate that characterizes them. When water can flow directly between the surface and the saturated zone of an aquifer, the aquifer is unconfined. The deeper parts of unconfined aquifers are usually more saturated with groundwater since gravity causes water to flow downward. The depth at which soil pore spaces or fractures and voids in rock become completely saturated with water is called the watertable. Groundwater is recharged from, and eventually flows to, the surface naturally. This natural discharge often occurs at springs and seeps, and can form oases or wetlands. Groundwater is also often withdrawn for agricultural, municipal, and industrial use by drilling and operating extraction wells.

Many of the park units addressed in this draft EIS are in areas where these groundwater aquifers are present. Big Cypress National Preserve, for instance, is located on a surficial aquifer system of unconsolidated sand and gravel aquifers that span much of Florida and southwestern Alabama. Surficial aquifers are shallow aquifers typically less than 50 feet in thickness and comprised mostly of beds of unconsolidated sand, cavity-riddled limestone and shells, sandstone, sand, and clay sand with minor clay or silt from the Pliocene to Holocene periods. These aquifers principally supply large municipalities for domestic and commercial uses. The thickness of this surficial aquifer system in Florida is as much as 400 feet in some areas and consists mostly of unconsolidated sand, shelly sand, and shell deposits. The most productive parts of the surficial aquifer system are in southwestern Florida, where complex interbedding of fine- and coarse-textured rocks ranging from late Miocene to Holocene in age and limestone beds of the Tamiami and Fort Thompson Formations form an important and highly permeable part of the system. Groundwater in the system is under unconfined, or watertable, conditions practically everywhere, and most of the water that enters the system moves quickly along short flow paths and discharges as base flow to streams (USGS 1990).

Data and information on groundwater (absence/presence, quality, recharge, depth, and uses) varies widely across national park system units and would therefore need to be assessed for each unique park unit and location during the planning for site-specific oil and gas projects. Principal aquifers associated with park units addressed in this draft EIS include those of the Colorado Plateaus, the Coastal Lowlands, and the Low Tertiary, Mississippian, Pennsylvanian and Valley and ridge geologic provinces (USGS 1990). These principal aquifers can be comprised of carbonate rock, igneous and metamorphic rock, sandstone or unconsolidated sand and gravel. The geographic distribution associated with these rock types is illustrated in figure 3. Multiple aquifers are present within, and distributed throughout, each of these formations. The USEPA defines a “sole-source aquifer” as an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. These areas may have no alternative drinking water sources that could physically, legally, and economically supply all those who depend on the aquifer for drinking water (USEPA 2013c). The Biscayne Aquifer, which underlies portions of Big Cypress National Preserve and Everglades National Park, is the only designated sole source aquifer associated with a category 1 or 2 park unit.



Note: Refer to "Abbreviations of National Park Names" that starts on page xxx of this document for a complete list of park names identified in this figure.

FIGURE 3. AQUIFER TYPES ASSOCIATED WITH CATEGORY 1 AND 2 PARK UNITS

WETLANDS

Wetlands include areas inundated or saturated by surface or groundwater for a sufficient length of time during the growing season to develop and support characteristic soils and vegetation. The NPS classifies wetlands based on the U.S. Fish and Wildlife Service (USFWS) *Classification of Wetlands and Deepwater Habitats of the United States*, also known as the Cowardin classification system (Cowardin et al. 1979). Based on this classification system, a wetland must have one or more of the following attributes:

- The habitat at least periodically supports predominately hydrophytic vegetation (wetland vegetation);
- The substrate is predominately undrained hydric soil;
- The substrate is nonsoil and saturated with water, or covered by shallow water at some time during the growing season.

Director’s Order 77-1 establishes NPS policies, requirements, and standards for implementing Executive Order 11990: Protection of Wetlands (42 Fed. Reg. 26961). Executive Order 11990 was issued by President Carter in 1977 in order “...to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative....” NPS Director’s Order 77-1: Wetland Protection and Procedural Manual 77-1 provide NPS policies and procedures for complying with Executive Order 11990. As stated (NPS 2002a):

Actions proposed by the NPS that have the potential to have adverse impacts on wetlands will be addressed in an Environmental Assessment (EA) or an Environmental Impact Statement (EIS). If the alternative in an EA or EIS will result in adverse impacts on wetlands, a “Statement of Findings (SOF)” documenting compliance with this Director’s Order and its implementation procedures will be completed.

Many of the category 1 and 2 parks units have various types of wetlands, including but not limited to wet meadows, swamps, marshes, arroyos, bogs, playas, and vernal pools. The values of these wetlands are based on their functionality and their ability to provide both environmental and economic benefits. For example, wetlands trap sediment and pollutants from stormwater runoff and provide a natural filter before this runoff can enter local waterways. Wetlands can also store large volumes of water and function as a “sponge” to reduce the likelihood of flooding during storm events. In addition, wetlands protect the shoreline from erosion and provide habitat for fish and wildlife. Table 13 lists each of the category 1 and 2 park units with wetlands.

TABLE 13. CATEGORY 1 AND 2 PARK UNITS WITH WETLANDS

Park Unit	Predominant Wetland Type
Category 1 Park Units	
Aztec Ruins National Monument	Riparian
Big Cypress National Preserve	Freshwater emergent, freshwater forested/shrub, estuarine and marine wetland and estuarine and marine deep water
Big South Fork National River and Recreation Area	Palustrine, riverine, and lacustrine systems
Big Thicket National Preserve	Palustrine, estuarine, riverine, and lacustrine systems

Park Unit	Predominant Wetland Type
Cumberland Gap National Historic Park	Cumberland streamside bog
Cuyahoga Valley National Park	Emergent, marshes, wet meadows, scrub/shrub, and forested
Gauley River National Recreation Area	Riverine and freshwater emergent
Lake Meredith National Recreation Area	Palustrine, riverine, and lacustrine systems
New River Gorge National River	Riverine, freshwater emergent, and freshwater pond
Obed Wild and Scenic River	Palustrine and riverine systems
Padre Island National Seashore	Palustrine, estuarine, and marine systems
Category 2 Park Units	
Bluestone National Scenic River	Riverine and freshwater emergent
Cane River Creole National Historical Park	Palustrine
Carlsbad Caverns National Park	Freshwater pond and freshwater emergent
Dinosaur National Monument	Riverine
Everglades National Park	Freshwater emergent, freshwater forested/shrub, estuarine and marine wetland, and estuarine and marine deep water
Fort Necessity National Battlefield	Freshwater pond and freshwater emergent
Friendship Hill National Historic Site	Freshwater pond and freshwater emergent
Glen Canyon National Recreation Area	Lacustrine and riverine systems
Grand Teton National Park	Riverine, freshwater emergent, freshwater pond, and lake
Great Sand Dunes National Park and Preserve	Riverine and palustrine (marsh)
Guadalupe Mountains National Park	Riverine and freshwater pond
Gulf Islands National Seashore	Palustrine, estuarine, and marine systems
Indiana Dunes National Lakeshore	Palustrine marsh, swamp, bog, fen, and forested
Jean Lafitte National Historic Park and Preserve	Freshwater emergent, freshwater forested/shrub, estuarine, and marine
Johnstown Flood National Memorial	Palustrine emergent, riverine (upper perennial, unconsolidated bottom, and palustrine scrub shrub)
Little River Canyon National Preserve	Riverine and freshwater emergent
Mammoth Cave National Park	Upland
Mesa Verde National Park	Riverine and freshwater emergent
Palo Alto Battlefield National Historic Site	Palustrine
San Antonio Missions National Historical Park	Riverine and palustrine (marsh) systems
Sand Creek Massacre National Historic Site	Riverine and freshwater emergent
Santa Monica Mountains National Recreation Area	Seasonal wetlands and vernal pools
Theodore Roosevelt National Park	Riverine
Upper Delaware Scenic and Recreational River	Forested, scrub-shrub, emergent, and aquatic bed
Washita Battlefield National Historic Site	Riverine and marsh

Sources: Correspondence with park resource specialists; oil and gas management plans, where available; and data obtained from the National Wetlands Inventory.

The specific wetlands that occur within park units are dependent upon the physiographic and climatologic features of the individual park and location within the park. Distance to wetlands was assessed for all exempt well locations, using National Wetlands Inventory wetlands data and mapping, and results are provided in appendix C. Table 14 below provides descriptions of the major wetland types listed in both table 13 and appendix C. Although this gives a good overview of wetland resources in the parks and at well locations, the National Wetlands Inventory data may miss smaller, isolated, or special case wetlands, so each site with an exempt well will be assessed at the time of permitting for presence of wetlands.

TABLE 14. SELECTED WETLAND DESCRIPTIONS

Classification	Type	Description
System	Marine	The marine system consists of the open ocean overlying the continental shelf and its associated high-energy coastline. Marine habitats are exposed to the waves and currents of the open ocean and the water regimes are determined primarily by the ebb and flow of oceanic tides. Salinities exceed 30‰, with little or no dilution except outside the mouths of estuaries. Shallow coastal indentations or bays without appreciable freshwater inflow, and coasts with exposed rocky islands that provide the mainland with little or no shelter from wind and waves, are also considered part of the marine system because they generally support typical marine biota.
	Estuarine	The estuarine system consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land. The salinity may be periodically increased above that of the open ocean by evaporation. Along some low-energy coastlines there is appreciable dilution of sea water. The estuarine system includes both estuaries and lagoons. It is more strongly influenced by its association with land than is the marine system.
	Riverine	The riverine system includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5‰. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water. The riverine system is divided into four subsystems: the tidal, the lower perennial, the upper perennial, and the intermittent. Each is defined in terms of water permanence, gradient, water velocity, substrate, and the extent of floodplain development.
	Lacustrine	The lacustrine system includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; and (3) total area exceeds 8 ha (20 acres). Similar wetland and deepwater habitats totaling less than 8 ha are also included if an active wave-formed or bedrock shoreline feature makes up all or part of the boundary, or if the water depth in the deepest part of the basin exceeds 2 m (6.6 feet) at low water. Lacustrine waters may be tidal or nontidal, but ocean-derived salinity is always less than 0.5‰.

Classification	Type	Description
	Palustrine	The palustrine system includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5%. It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 ha (20 acres); (2) active wave-formed or bedrock shoreline features lacking; (3) water depth in the deepest part of basin less than 2 m at low water; and (4) salinity due to ocean-derived salts less than 0.5%. The palustrine system was developed to group the vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen, and prairie, which are found throughout the United States. It also includes the small, shallow, permanent, or intermittent water bodies often called ponds.
Subsystem	Intertidal	The substrate is exposed and flooded by tides; includes the associated splash zone.
	Subtidal	The substrate is continuously submerged.
	Tidal	The gradient is low and water velocity fluctuates under tidal influence. The streambed is mainly mud with occasional patches of sand. Oxygen deficits may sometimes occur and the fauna is similar to that in the lower perennial subsystem. The floodplain is typically well developed.
	Lower Perennial	The gradient is low and water velocity is slow. There is no tidal influence, and some water flows throughout the year. The substrate consists mainly of sand and mud. Oxygen deficits may sometimes occur, the fauna is composed mostly of species that reach their maximum abundance in still water, and true planktonic organisms are common. The gradient is lower than that of the upper perennial subsystem and the floodplain is well developed.
	Upper Perennial	The gradient is high and velocity of the water fast. There is no tidal influence and some water flows throughout the year. The substrate consists of rock, cobbles, or gravel with occasional patches of sand. The natural dissolved oxygen concentration is normally near saturation. The fauna is characteristic of running water, and there are few or no planktonic forms. The gradient is high compared with that of the lower perennial subsystem, and there is very little floodplain development.
	Intermittent	The channel contains flowing water for only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent.
	Limnetic	All deepwater habitats within the lacustrine system; many small lacustrine systems have no limnetic subsystem.
	Littoral	All wetland habitats in the lacustrine system. Extends from the shoreward boundary of the system to a depth of 2 m (6.6 feet) below low water or to the maximum extent of nonpersistent emergent plants, if these grow at depths greater than 2 m.
Class	Scrub-Shrub	The scrub-shrub wetland class includes areas dominated by woody vegetation less than 6 m (20 feet) tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. All water regimes except subtidal are included. Scrub-shrub wetlands may represent a successional stage leading to forested wetland, or they may be relatively stable communities. They are known by many names, such as shrub swamp, shrub carr, bog, and pocosin. For practical reasons we have also included forests composed of young trees less than 6 m tall.
	Aquatic Bed	The aquatic bed class includes wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years. Water regimes include subtidal, irregularly exposed, regularly flooded, permanently flooded, intermittently exposed, semipermanently flooded, and seasonally flooded.

Classification	Type	Description
	Persistent	Persistent emergent wetlands are dominated by species that normally remain standing at least until the beginning of the next growing season. This subclass is found only in the estuarine and palustrine systems. Persistent emergent wetlands dominated by saltmarsh cordgrass (<i>Spartina alterniflora</i>), saltmeadow cordgrass (<i>S. patens</i>), big cordgrass (<i>S. cynosuroides</i>), needlerush (<i>Juncus roemerianus</i>), narrowleaved cattail (<i>Typha angustifolia</i>), and southern wild rice (<i>Zizaniopsis miliacea</i>) are major components of the estuarine systems of the Atlantic and Gulf Coasts of the United States.
	Emergent	The emergent wetland class is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. All water regimes are included except subtidal and irregularly exposed.
	Unconsolidated Bottom	The unconsolidated bottom class includes all wetland and deepwater habitats with at least 25% cover of particles smaller than stones, and a vegetative cover less than 30%. Water regimes are restricted to subtidal, permanently flooded, intermittently exposed, and semipermanently flooded. Unconsolidated bottoms are characterized by the lack of large stable surfaces for plant and animal attachment. They are usually found in areas with lower energy than rock bottoms, and may be very unstable. Exposure to wave and current action, temperature, salinity, and light penetration determines the composition and distribution of organisms.
	Unconsolidated Shore	The unconsolidated shore class includes all wetland habitats having three characteristics: (1) unconsolidated substrates with less than 75% areal cover of stones, boulders, or bedrock; (2) less than 30% areal cover of vegetation other than pioneering plants; and (3) any of the following water regimes: irregularly exposed, regularly flooded, irregularly flooded, seasonally flooded, temporarily flooded, intermittently flooded, saturated, or artificially flooded. Unconsolidated shores are characterized by substrates lacking vegetation except for pioneering plants that become established during brief periods when growing conditions are favorable. Erosion and deposition by waves and currents produce a number of landforms such as beaches, bars, and flats, all of which are included in this class.
	Rock Bottom	Includes all wetlands and deepwater habitats with substrates having a covered area of stones, boulders, or bedrock 75% or greater and vegetative cover of less than 30%. Water regimes are restricted to subtidal, permanently flooded, intermittently exposed, and semipermanently flooded.
	Rock Shore	Includes wetland environments characterized by bedrock, stones, or boulders which singly or in combination have a covered area of 75% or more and coverage by vegetation of less than 30%. Water regimes are restricted to irregularly exposed, regularly flooded, irregularly flooded, seasonally flooded, temporarily flooded, and intermittently flooded.
	Forested	The forested wetland class is characterized by woody vegetation that is 6 m tall or taller. All water regimes are included except subtidal. Forested wetlands are most common in the eastern United States and in those sections of the West where moisture is relatively abundant, particularly along rivers and in the mountains. They occur only in the palustrine and estuarine systems and normally possess an overstory of trees, an understory of young trees or shrubs, and an herbaceous layer. Forested wetlands in the estuarine system, which include the mangrove forests of Florida, Puerto Rico, and the Virgin Islands, are known by such names as swamps, hammocks, heads, and bottoms. These names often occur in combination with species names or plant associations such as cedar swamp or bottomland hardwoods.

Source: Cowardin et al. 1979.

FLOODPLAINS

Floodplains consist of flat or nearly flat land adjacent to a water body that experiences occasional or periodic flooding. Flood insurance rate maps produced by the Federal Emergency Management Agency delineate areas of potential flooding. As required by Director's Order 77-2, the NPS must protect and preserve the natural resources and functions of floodplains, avoid environmental effects associated with the occupancy and modification of floodplains, avoid actions that could adversely affect wetland functions, and restore floodplain values previously affected by activities in floodplains (NPS 2003). To implement the NPS floodplain policy, proposed actions are classified as fitting into one of three classes:

- Class I includes the location or construction of administrative, residential, warehouse and maintenance buildings, nonexcepted parking lots or other man-made features, which by their nature entice or require individuals to occupy the site, are prone to flood damage, or result in impacts on natural floodplain values. Actions in this class are subject to the floodplain policies and procedures if they lie within the 100-year regulatory floodplain (the base floodplain).
- Class II includes "critical actions," those activities for which even a slight chance of flooding would be too great. Examples of critical actions include schools, hospitals, fuel storage facilities, irreplaceable records, museums, and storage of archeological artifacts. Actions in this class are subject to the floodplain policies and procedures if they lie within the 500-year regulatory floodplain.
- Class III includes all class I or class II actions that are located in high hazard areas, including coastal high hazard areas and areas subject to flash flooding. Actions in this class are subject to the floodplain policies and procedures if they lie within the extreme flood regulatory floodplain.

If a proposed action is found to be in a regulatory floodplain and relocating the action to a nonfloodplain site is considered not to be a viable alternative, then flood conditions and associated hazards must be quantified as a basis for management decision-making and a formal statement of findings must be prepared.

Some portions of individual park units addressed in this draft EIS are likely to be located within 100-year floodplains and are subject to high watertable conditions and the drainage and flooding issues that often result from storm events. Generally, lands along the ocean beaches or adjacent to estuaries (at wide points) are located in flood insurance rate areas that correspond to 100-year floodplains that have additional hazards associated with flooding. Data and information on specific flood zones vary widely across national park system units. Table 15 lists each of the category 1 and 2 park units within 100-year floodplains. Distance to 100-year floodplains was assessed for all exempt well locations, and results are listed in appendix C.

TABLE 15. CATEGORY 1 AND 2 PARK UNITS WITHIN 100-YEAR FLOODPLAIN

Park Unit
Category 1 Park Units
Alibates Flint Quarries National Monument
Aztec Ruins National Monument
Big Cypress National Preserve
Big South Fork National River and Recreation Area
Big Thicket National Preserve

Park Unit
Cumberland Gap National Historic Park
Cuyahoga Valley National Park
Gauley River National Recreation Area
Lake Meredith National Recreation Area
New River Gorge National River
Obed Wild and Scenic River
Padre Island National Seashore
Category 2 Park Units
Bluestone National Scenic River
Cane River Creole National Historical Park
Dinosaur National Monument
Everglades National Park
Flight 93 National Memorial
Fort Necessity National Battlefield
Fort Union Trading Post National Historic Site
Glen Canyon National Recreation Area
Grand Teton National Park
Great Sand Dunes National Park and Preserve
Guadalupe Mountains National Park
Gulf Islands National Seashore
Hopewell Culture National Historical Park
Indiana Dunes National Lakeshore
Jean Lafitte National Historic Park & Preserve
Johnstown Flood National Memorial
Little River Canyon National Preserve
Mammoth Cave National Park
Mesa Verde National Park
Palo Alto Battlefield National Historic Site
Theodore Roosevelt National Park
Upper Delaware Scenic and Recreational River
Washita Battlefield National Historic Site

Source: Correspondence with park resource specialists.

VEGETATION

The NPS has organized 270 park units with substantial natural resources into 32 ecoregional networks to conduct inventory and monitoring activities. Inventory and Monitoring (I&M) networks are delineated based roughly on ecoregions with similar geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology.

In addition, the U.S. Department of Agriculture and other federal agencies identify natural resources of the United States within specific geographically delineated “ecoregions” classified by geographer Robert G. Bailey (1995). Within this classification system, four levels of detail show a hierarchy of ecosystems. The largest ecosystems are domains, four groups of related climates that are differentiated based on precipitation and temperature. Divisions represent the climates within domains and are differentiated based on precipitation levels and patterns as well as temperature. Divisions are subdivided into provinces, which are differentiated based on vegetation or other natural land covers. The finest level of detail is described by subregions, called sections, which are subdivisions of provinces based on terrain features. Also identified are mountainous areas that exhibit different ecological zones based on elevation.

VEGETATION TYPES IN POTENTIALLY AFFECTED PARK UNITS

Each park unit in the system contains a unique assemblage of vegetation types, which can be categorized by the U.S. Department of Agriculture ecoregion within which the park unit is contained. Table 16 lists category 1 and 2 park units and their associated ecoregions, as well as any park-specific information regarding vegetation that has been noted in NPS I&M reports. The discussion that follows describes the vegetation types that are generally associated with these ecoregions.

TABLE 16. VEGETATION TYPES WITHIN CATEGORY 1 AND 2 PARK UNITS

Park Unit	Ecoregion	Major Vegetative Cover
Category 1 Park Units		
Alibates Flint Quarries National Monument	Southwest Plateau and Plains Dry Steppe and Shrub Province	Short-grass prairie
Aztec Ruins National Monument	Colorado Plateaus Semi-Desert Province	Pinyon-juniper woodland, sagebrush communities, saltbush communities, galleta grassland, blue grama grassland, riparian-evergreen and evergreen/deciduous, tamarisk or Russian olive riparian, wetland/spring/seep herbaceous communities
Big Cypress National Preserve	Everglades Province	Cypress strands and domes, pines, wet prairies, marshes, sloughs, mangrove forests, and hardwood hammocks
Big South Fork National River and Recreation Area	Eastern Broadleaf Forest (Oceanic) Province	Forests of mixed oak, Virginia pine, red maple, hickory, sugar maple, black birch, beech, white oak, white pine, eastern hemlock
Big Thicket National Preserve	Southeastern Mixed Forest Province	Potential natural vegetation includes wetland pine savanna, hardwood pine and oak forest, and upland and sandhill pine forest
Cumberland Gap National Historic Park	Eastern Broadleaf Forest (Oceanic) Province	Oak-hickory forest, hemlock and pine forest
Cuyahoga Valley National Park	Eastern Broadleaf Forest (Continental) Province	Eastern deciduous forest; oak-hickory forests; mixed mesophytic and northern hardwoods forests
Gauley River National Recreation Area	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province	Mixed oak-pine forests, dominated white and black oak groups and some northeast hardwood forest, composed of birch, maple, elm, red oak, and basswood, with an admixture of hemlock and white pine

Park Unit	Ecoregion	Major Vegetative Cover
Lake Meredith National Recreation Area	Southwest Plateau and Plains Dry Steppe and Shrub Province	Predominant vegetative cover is grasslands comprised of blue grama, little bluestem, and buffalo grasses
New River Gorge National River	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province	Oak and pine forest; mixed mesophytic forests of other nonoak hardwoods
Obed Wild and Scenic River	Eastern Broadleaf Forest (Oceanic) Province	Forests of white oak, beech, tulip poplar, river birch, eastern hemlock, sweet birch, Virginia pine, scarlet oak, chestnut oak
Padre Island National Seashore	Southwest Plateau and Plains Dry Steppe and Shrub Province	Mostly grasses
Category 2 Park Units		
Bluestone National Scenic River	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province	Mixed oak and pine forests
Cane River Creole National Historical Park	Outer Coastal Plain Mixed Forest Province	Oak forests
Carlsbad Caverns National Park	Arizona-New Mexico Mountains Semi-Desert-Open Woodland-Coniferous Forest-Alpine Meadow Province	Desert-scrub and grassland plant communities with small pockets of coniferous woodland at higher elevations
Dinosaur National Monument	Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province	Pinyon-juniper woodlands /savannas, sagebrush shrublands/shrub steppe, mixed grasslands/shrub steppe
Everglades National Park	Everglades Province	Wetlands, pineland, mangroves
Flight 93 National Memorial	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province	Primarily rolling fields of grass and herbs, with occasional areas of wetland vegetation
Fort Necessity National Battlefield	Eastern Broadleaf Forest (Oceanic) Province	Tulip tree-beech-maple forest, red oak-mixed hardwood, deciduous forest, pasture/meadow, coniferous forest, wetlands, and wet meadows
Fort Union Trading Post National Historic Site	Great Plains-Palouse Dry Steppe Province	Riparian floodplain forest in lower terrace and northern mixed-grass prairie in the uplands; cottonwood, ash, elm, and sedge; needle-and-thread, western wheatgrass, blue grama, and prairie coneflower
Friendship Hill National Historic Site	Eastern Broadleaf Forest (Oceanic) Province	Deciduous and coniferous forest, mixed mesophytic forest, floodplain forest, mixed hardwood forest
Glen Canyon National Recreation Area	Intermountain Semi-Desert and Desert Province	Pinyon-juniper woodland, saltbush communities, blackbrush communities
Grand Teton National Park	Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province	Riparian forest, sagebrush and grasses, lodgepole pine forests, subalpine fir at higher elevations
Great Sand Dunes National Park and Preserve	Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province	Seven broad life zones (sabkha, sand sheet, dunefield, pinyon-juniper woodland, montane woodland and forest, subalpine forest and meadows, and alpine tundra)

Park Unit	Ecoregion	Major Vegetative Cover
Guadalupe Mountains National Park	Arizona-New Mexico Mountains Semi-Desert-Open Woodland-Coniferous Forest-Alpine Meadow Province	Scattered riparian plant communities with small pockets of coniferous woodland found at higher elevations
Gulf Islands National Seashore	Outer Coastal Plain Mixed Forest Province	Maritime forests and seagrasses
Hopewell Culture National Historical Park	Eastern Broadleaf Forest (Oceanic) Province	Northern hardwoods and eastern deciduous forests
Indiana Dunes National Lakeshore	Eastern Broadleaf Forest (Continental) Province	White pines, native prairie grasses, flowering plants, and ferns
Jean Lafitte National Historic Park and Preserve	Outer Coastal Plain Mixed Forest Province	Hardwood forest; swamp, “flotant” freshwater marsh
Johnstown Flood National Memorial	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province	Old field, red maple-black cherry successional forest/woodland, eastern hemlock-northern hardwood forest, conifer plantation, silky willow shrub swamp, cattail marsh, reverine scour vegetation
Little River Canyon National Preserve	Southeastern Mixed Forest Province	Oak/hickory pine forest
Mammoth Cave National Park	Eastern Broadleaf Forest (Continental) Province	Second-growth forests, mesic hollows, upland mesic sites, deciduous trees
Mesa Verde National Park	Colorado Plateaus Semi-Desert Province	Pinyon-juniper woodland, oak shrubland, montane grassland
Nicodemus National Historic Site	Great Plains Steppe Province	Mixed-grass prairie or savannah
Palo Alto Battlefield National Historic Site	Southwest Plateau and Plains Dry Steppe and Shrub Province	Coastal prairie, mesquite, acacia, cord grass, yucca, prickly-pear cactus
San Antonio Missions National Historical Park	Southwest Plateau and Plains Dry Steppe and Shrub Province	Riparian forests, grassland, scrubland
Sand Creek Massacre National Historic Site	Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province	Arid grasslands with shrubs and low trees. Other species include blue grama, buffalo grass, mesquite, oak, juniper, and needlegrass
Santa Monica Mountains National Recreation Area	California Coastal Chaparral Forest and Shrub Province	Coastal salt marsh, coastal strand, coastal sage scrub, chaparral, coast live oak woodland, riparian woodland, valley oak savanna, and valley grassland
Steamtown National Historic Site	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province	Historic railyard, urbanized
Theodore Roosevelt National Park	Great Plains-Palouse Dry Steppe Province	Native prairie, forest, shrubland, barren
Upper Delaware Scenic and Recreational River	Laurentian Mixed Forest Province	Riparian and northern hardwood forest
Washita Battlefield National Historic Site	Great Plains Steppe and Shrub Province	Mixed-grass prairie or savannah

Sources: Bailey 1995; USDA 2007, 2008; NPS I&M Network plans and appendices, supplemented by park websites, oil and gas management plans and GMPs, where available; and correspondence with park resource specialists.

Arizona-New Mexico Mountains Semi-Desert-Open Woodland-Coniferous Forest-Alpine Meadow Province

Vegetational zones resemble those of the Rocky Mountains, but occur at higher elevations. The foothill zone, which reaches as high as 7,000 feet, is characterized by mixed grasses, chaparral brush, oak-juniper woodland, and pinyon-juniper woodland. At about 7,000 feet, open forests of ponderosa pine are found, although pinyon and juniper occupy south-facing slopes. At 8,000 feet, pine forest is replaced on north-facing slopes by Douglas fir. Aspen is common in this zone. At about 9,000 feet, the Douglas-fir zone merges into a zone of Engelman spruce and corkbark fir. Limber pines and bristlecone pines grow in the rockier places.

Desert-scrub and grassland plant communities dominate the landscape at Carlsbad Caverns National Park. Guadalupe Mountains National Park within the Chihuahuan Desert contains small pockets of coniferous woodland, remnants of the coniferous forest that covered much of the area about 15,000 years ago and are found at higher elevations in the western third of the park. McKittrick Canyon contains the park's only perennial stream. It supports riparian plant communities in the park, along with a number of springs, seeps, and ephemeral washes. The mountain foothills and surrounding plains are characterized by Chihuahuan Desert vegetation, including specialized desert scrub communities found in the salt flat and dune areas.

California Coastal Chaparral Forest and Shrub Province

Monterey cypress, Torrey pine, Monterey pine, and bishop pine are endemic to the ecoregion. Coastal plains and valleys have sagebrush and grassland communities. Riparian forests containing many broadleaf species grow along streams. Live and white oak is found on hills and lower mountains. Chaparral forest consisting of chamise and various manzanitas is found on steep hill and mountain slopes. Exposed coastal areas support desert-like shrub communities dominated by coyote bush, California sagebrush, and bush lupine.

Santa Monica Mountains National Recreation Area contains coastal salt marsh, coastal strand, coastal sage scrub, chaparral, coast live oak woodland, riparian woodland, valley oak savanna, and valley grassland.

Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province

Valleys support mixed oak-pine forest, above which lies the Appalachian oak forest, dominated by a dozen species each in the white oak and black oak groups. Above this zone lies the northeast hardwood forest, composed of birch, maple, elm, red oak, and basswood, with a mixture of hemlock and white pine. Spruce-fir forest and meadows are found on the highest peaks of the Allegheny and Great Smoky Mountains. Mixed forest of mesophytic type (that is, containing terrestrial plants which are adapted to neither a particularly dry nor particularly wet environment) extends into narrow valleys of the southern Appalachians, where oak predominates.

New River Gorge National River and Gauley River National Recreation Area support mixed mesophytic forest, pine, oak and other hardwoods.

Coastal Trough Humid Tayga Province

Throughout the Cook Inlet Lowlands, lowland spruce-hardwood forests are abundant. Bottom land spruce-poplar adjoins the larger river drainages, along with thickets of alder and willow. There are wet tundra communities along the Cook Inlet coastline. The Copper River Lowland is characterized by black

spruce forest interspersed with large areas of brushy tundra. White spruce forests occur on south-facing gravelly moraines, and cottonwood-tall bush communities are common in large floodplains.

Colorado Plateaus Semi-Desert Province

Arid grasslands occupy the lowest zone with shortgrass sod seldom covering the ground completely. Xeric shrubs grow in open stands along the grasses, and sagebrush is dominant over extensive areas. In this zone, a profusion of annuals and perennial plants bloom during the summer rainy season and several kinds of cactus and yucca are common at low elevations in the south. Cottonwoods commonly occupy riparian areas. Pinyon pine and juniper dominate the woodland zone, while the montane zone is characterized by ponderosa pine in the south and lodgepole pine and aspen in the north.

Eastern Broadleaf Forest (Oceanic) Province

This province is characterized by winter deciduous forest dominated by tall broadleaf trees that provide dense continuous summer canopy and shed their leaves completely in winter. Forest vegetation is divided into three major associations: mixed mesophytic (with American beech, tulip tree, basswoods sugar maple and eastern hemlock dominant), Appalachian oak (with white oak and northern red oak dominant), and pine-oak.

The Big South Fork National River and Recreation Area and the Obed Wild and Scenic River contain a predominantly second-growth forest of mixed oak. Plant communities of Fort Necessity National Battlefield and Friendship Hill National Historic Site consist of deciduous and coniferous forest.

Eastern Broadleaf Forest (Continental) Province

This province is similar to its oceanic counterpart but is savanna-like in the northern reaches and characterized by the more drought-resistant oak-hickory association, with both species occurring in abundance. Widespread dominants are white oak, red oak, black oak, bitternut hickory, and shagbark hickory. Understory species include flowering dogwood, sassafras, and hophornbeam. Northern reaches of the oak-hickory forest contain increasing numbers of maple, beech, and basswood.

Indiana Dunes National Lakeshore has a rich diversity of plants, with over 1,100 flowering plant species and ferns, including predacious bog plants, native prairie grasses, and white pines.

Everglades Province

Tropical moist hardwood forest covers one-fifth of the area. Cypress forest is extensive, with mangrove widespread along the eastern and southern coasts. Much of the area is open marsh covered by phreatophytic grasses, reeds, sedges, and other aquatic herbaceous plants. Mahogany, redbay, and several palmettos are common, as well as strangler fig and abundant epiphytes.

Everglades National Park and Big Cypress National Preserve both include a wetland mosaic with cypress strands and domes, pines, wet prairies, marshes, sloughs, mangrove forests, and hardwood hammocks.

Great Plains Steppe and Shrub Province

Tall grasses predominate, extending west from the oak savanna of the eastern edge. Bluestem grama prairie covers the finer textured soils that characterize most of the province. Oak savanna occurs along the eastern border and along some of the major river valleys. Sandsage-bluestem prairies are dominant on the coarse textured soils near the provinces western edge.

Great Plains Steppe Province

This province contains a mixture of shortgrass and tallgrass species. Shorter dominants include blue grama, hairy grama, and buffalo grass. Taller grasses include little bluestem and needle-and-thread grass. Woody vegetation is rare, except on the cottonwood floodplains. In mixed grass steppe, additional species include green needlegrass, sand dropseed, slender wheatgrass, galleta, and purple three-awn.

Great Plains-Palouse Dry Steppe Province

This province consists of formations of short grasses, usually bunched and sparsely distributed in dry steppe or shortgrass prairie with six to seven arid months per year. The Great Plains grasslands east of the Rockies have scattered trees and shrubs, such as sagebrush and rabbitbrush. The typical grass is buffalo grass; sunflower and locoweed are typical plants. Gradations of cover vary from semidesert to woodland.

Fort Union Trading Post National Historic Site and Theodore Roosevelt National Park both contain riparian floodplain forests.

Intermountain Semi-Desert and Desert Province

Sagebrush dominates at lower elevations. Other important plants in the sagebrush belt are antelope bitterbrush, shadscale, fourwing saltbush, rubber rabbitbrush, spiny hopsage, horsebrush, and short-statured Gambel oak. A woodland zone dominated by pinyon pine and juniper lies above the sagebrush belt. Above the woodland zone, a montane belt occurs in which ponderosa pine generally occupies the lower and more exposed slopes and Douglas-fir the higher and more sheltered ones. In the rare occurrences of subalpine above the woodland zone, the characteristic trees are fir and Englemann spruce.

Laurentian Mixed Forest Province

This province is transitional, as it lies between the boreal forest and broadleaf deciduous forest zones. Partly consisting of mixed stands of a few coniferous species (mainly pine) and a few deciduous species (mainly yellow birch, sugar maple, and American beech). Mixed stands have several species of conifer, mainly northern white pine in the Great Lakes region, with an admixture of eastern hemlock. Eastern redcedar is found in the southeast. Pine trees are often the pioneer woody species that flourish in burned-over areas or on abandoned arable land.

Outer Coastal Plain Mixed Forest Province

Temperate rainforest consisting of evergreen oaks, laurels and magnolias is typical in this province. Lower stratum of vegetation includes tree ferns, small palms, shrubs and herbaceous plants. Lianas and epiphytes are abundant. Along the Atlantic coast, the extensive coastal marshes and interior swamps are dominated by gum and cypress.

Prairie Parkland (Temperate) Province

Vegetation is forest-steppe, characterized by intermingled prairie, groves, and strips of deciduous trees. Trees are commonly found near streams and on north-facing slopes. Grasses are the dominant prairie vegetation. Most are moderately tall and usually grow in bunches. The most prevalent type of grassland is bluestem prairie, dominated by such plants as big bluestem, little bluestem, switchgrass, and Indian grass, along with many species of wildflowers and legumes. The upland forest is dominated by oak and hickory. Cottonwood, black willow, and American elm dominate floodplains and moist hillsides in the western part of the province.

Southeastern Mixed Forest Province

Climax vegetation is provided by medium-tall to tall forests of broad-leaf deciduous and needleleaf evergreen trees. At least 50 percent of the stands are made up of loblolly pine, shortleaf pine, and other southern yellow pine species. Common associations include oak, hickory, sweetgum, blackgum, red maple, and winged elm. Main grasses are bluestem, panicums, and longleaf uniola. Dogwood, viburnum, haw, blueberry, American beautyberry, youpon, and numerous woody vines are common.

Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province

Englemann spruce and subalpine fir dominate the subalpine zone, while ponderosa pine and Douglas fir occupy the montane zone. Aspen or lodgepole pine replace original forest trees after fire in the subalpine zone. Grass, often mixed with sagebrush, regularly covers the ground in open ponderosa pine forests and some treeless areas.

Grand Teton National Park contains riparian forest of cottonwood, willow and aspen along the Snake River floodplain. Forests of lodgepole pine, Douglas-fir, and aspen occur at lower elevations; whitebark pine and subalpine fir occur at higher elevations; and sagebrush and grasses occurring on terraces above the floodplain. Dinosaur National Monument includes diverse vegetation zones from grasslands and shrublands to woodlands and forests.

Southwest Plateau and Plains Dry Steppe and Shrub Province

This province contains arid grasslands in which shrubs and low trees grow singly or in bunches. Other species include blue grama, buffalo grass, mesquite, oak, juniper, and needlegrass. The endangered sabal palm is native to the Rio Grande delta.

Lake Meredith National Recreation Area and Alibates Flint Quarries National Monument are located in short-grass prairie. The Palo Alto Battlefield National Historic Site is located at the southern tip of Texas, which is characterized by broad coastal prairie carpeted with clumps of razor-sharp cord grass and other low-lying grasses and flowers.

INVASIVE VEGETATION

Invasive vegetation refers to nonindigenous species that have colonized a particular habitat due to the suitability of that habitat for the maintenance of the species. Many invasive species adversely affect the habitats they invade economically, environmentally, or ecologically. Such vegetation is present in every park unit and various management efforts are ongoing to deal with the establishment and spread of invasive species.

SPECIES OF SPECIAL MANAGEMENT CONCERN

Under the Endangered Species Act of 1973 (ESA), the NPS has the responsibility to address impacts on federally listed threatened, endangered, and species proposed for listing. The terms “threatened” and “endangered” describe the official federal status of certain species as defined by the ESA.

Under the ESA, “candidate” species receive no statutory protection, but the USFWS encourages cooperative conservation efforts for these species because they are, by definition, species that may warrant future protection under the ESA. The term “candidate” is used officially by the USFWS when describing those species for which it has on file sufficient information on biological vulnerability and

threats to support issuance of a “proposed rule to list,” but for which issuance of the proposed rule is precluded due to other higher priority listings. The term “proposed” describes species for which a “proposed rule to list” has been published in the Federal Register; however, a finalized rule has not yet been issued. Section 4.4.2.3 of the NPS *Management Policies 2006* (Management of Threatened or Endangered Plants and Animals), moreover, directs the agency to consider federally listed threatened, endangered, and candidate species proposed for listing, as well as state-listed species, to the extent practical in its decision making.

The park units addressed in this draft EIS provide habitat that supports hundreds of species of plants that are threatened, endangered, or of special concern at the national, regional, and state level. Some of these species and their habitats may occur in areas suitable for oil and gas development. The federally threatened Virginia spiraea, for instance, is found in the Appalachian Plateaus and southern Blue Ridge Mountains of Alabama, Ohio, West Virginia, Virginia, Tennessee, North Carolina, Kentucky, and Georgia. It is also present throughout Big South Fork National River and Recreation Area, Gauley River National Recreation Area, Obed Wild and Scenic River, and Bluestone National Scenic River. Data and information on special-status plant species related to each park unit were provided through consultation with park resource management staff and by accessing the NPS Integrated Resource Management Applications web portal, available online at <https://irma.nps.gov>.

Appendix E is a list of federally listed species known to occur or likely to occur in the category 1 and 2 parks. Appendix F provides similar information for state-listed species. Appendix G summarizes which federally listed species are likely to occur on or near the exempt well locations within the category 1 parks, based on the site-specific vegetation cover reported on those well sites in the NPS database and the habitat preferences of the species.

WILDLIFE AND AQUATIC SPECIES

Each park unit of the national park system contains a variety of habitats that support various wildlife assemblages including diverse populations of mammals, amphibians, reptiles, fish, invertebrates, and birds. NPS maintains an extensive inventory of all the species contained within each park unit. Because geographic provinces contain similar wildlife species, general wildlife characteristics of individual parks can be ascertained by their associated region. Table 17 lists each of the category 1 and 2 park units considered in this EIS and their associated ecoregion. In keeping with the programmatic level of detail provided for wildlife and aquatic species occurring at each of the category 1 and 2 park units, the discussion following table 17 describes notable fish and wildlife communities occurring within these ecoregions.

TABLE 17. FISH AND WILDLIFE WITHIN CATEGORY 1 AND 2 PARK UNITS

Park Unit	Ecoregion
Category 1 Park Units	
Alibates Flint Quarries National Monument	Southwest Plateau and Plains Dry Steppe and Shrub Province
Aztec Ruins National Monument	Colorado Plateaus Semi-Desert Province
Big Cypress National Preserve	Everglades Province
Big South Fork National River and Recreation Area	Eastern Broadleaf Forest (Oceanic) Province
Big Thicket National Preserve	Southeastern Mixed Forest Province
Cumberland Gap National Historic Park	Eastern Broadleaf Forest (Oceanic) Province

Park Unit	Ecoregion
Cuyahoga Valley National Park	Eastern Broadleaf Forest (Continental) Province
Gauley River National Recreation Area	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province
Lake Meredith National Recreation Area	Southwest Plateau and Plains Dry Steppe and Shrub Province
New River Gorge National River	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province
Obed Wild and Scenic River	Eastern Broadleaf Forest (Oceanic) Province
Padre Island National Seashore	Southwest Plateau and Plains Dry Steppe and Shrub Province
Category 2 Park Units	
Bluestone National Scenic River	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province
Cane River Creole National Historical Park	Outer Coastal Plain Mixed Forest Province
Carlsbad Caverns National Park	Arizona-New Mexico Mountains Semi-Desert-Open Woodland-Coniferous Forest-Alpine Meadow Province
Dinosaur National Monument	Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province
Everglades National Park	Everglades Province
Flight 93 National Memorial	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province
Fort Necessity National Battlefield	Eastern Broadleaf Forest (Oceanic) Province
Fort Union Trading Post National Historic Site	Great Plains-Palouse Dry Steppe Province
Friendship Hill National Historic Site	Eastern Broadleaf Forest (Oceanic) Province
Glen Canyon National Recreation Area	Intermountain Semi-Desert and Desert Province
Grand Teton National Park	Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province
Great Sand Dunes National Park and Preserve	Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province
Guadalupe Mountains National Park	Arizona-New Mexico Mountains Semi-Desert-Open Woodland-Coniferous Forest-Alpine Meadow Province
Gulf Islands National Seashore	Outer Coastal Plain Mixed Forest Province
Hopewell Culture National Historical Park	Eastern Broadleaf Forest (Oceanic) Province
Indiana Dunes National Lakeshore	Eastern Broadleaf Forest (Continental) Province
Jean Lafitte National Historic Park and Preserve	Outer Coastal Plain Mixed Forest Province
Johnstown Flood National Memorial	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province
Little River Canyon National Preserve	Southeastern Mixed Forest Province
Mammoth Cave National Park	Eastern Broadleaf Forest (Continental) Province
Mesa Verde National Park	Colorado Plateaus Semi-Desert Province
Nicodemus National Historic Site	Great Plains Steppe Province

Park Unit	Ecoregion
Palo Alto Battlefield National Historic Site	Southwest Plateaus and Plains Dry Steppe and Shrub Province
San Antonio Missions National Historical Park	Southwest Plateaus and Plains Dry Steppe and Shrub Province
Sand Creek Massacre National Historic Site	Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province
Santa Monica Mountains National Recreation Area	California Coastal Chaparral Forest and Shrub Province
Steamtown National Historic Site	Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province
Theodore Roosevelt National Park	Great Plains-Palouse Dry Steppe Province
Upper Delaware Scenic and Recreational River	Laurentian Mixed Forest Province
Washita Battlefield National Historic Site	Great Plains Steppe and Shrub Province

Sources: USDA 2007; NPS I&M Network plans and appendices; oil and gas management plans and GMPs, where available.

Arizona-New Mexico Mountains Semi-Desert-Open Woodland-Coniferous Forest-Alpine Meadow Province

In this region, the most common large mammal is the mule deer. Mammalian predators include mountain lions, coyotes, and bobcats. Small mammals are the deer mouse, longtail weasel, porcupine, golden-mantled ground squirrel, Colorado chipmunk, red squirrel, wood rat, pocket gopher, longtail vole, Abert squirrel, and cottontail. Some of the more common birds are the northern pygmy-owl, olive warbler, red-faced warbler, hepatic tanager, mountain bluebird, pygmy nuthatch, white-breasted nuthatch, Mexican junco, Stellar's jay, red-shafted flicker and the Rocky Mountain sapsucker. Goshawks and red-tailed hawks are also present. The only common reptile in this ecoregion is the short-horned lizard.

California Coastal Chaparral Forest and Shrub Province

Brushy rabbit and opossum are common in this ecoregion. Several species of seals and sea lions live along the California coast. Sea otters and blue whale also inhabit the coastal waters. Coastal California is a major migration route for water and land birds. Shore birds, ducks, and geese inhabit coastal estuaries, lagoons, and mudflats. Other birds include the lesser goldfinch and golden-crowned sparrow.

Central Appalachian Broadleaf Forest-Coniferous Forest-Meadow Province

Black bear and whitetail deer are very common throughout the Appalachians. At higher elevations in boreal forest, red-breasted nuthatches, black-throated green warblers, golden-crowned warblers, golden-crowned kinglets, and northern juncos forage in red spruce and Frasier fir trees. In hardwood forests, pileated woodpeckers, downy, hairy and red-bellied woodpeckers, common flickers, and wild turkeys are common. The region hosts 27 species of salamanders.

Coastal Trough Humid Tayga Province

In this region, muskrats and red foxes are common, as well as moose in lowland areas, and Dall sheep in the uplands. Black bear populations are dense throughout the region. Trumpeter swans nest and tundra swans are present during migration. King, sockeye, and silver salmon are common.

Colorado Plateaus Semi-Desert Province

Mule deer, mountain lion, coyote, bobcat, elk, and antelope share this province with smaller species such as the blacktail jackrabbit, Colorado chipmunk, rock squirrel, wood rat, white-footed mouse, cliff chipmunk, cottontail, porcupine, and gray fox. Ringtail cat and spotted skunk occur rarely in this region. Common birds include the bushtit, pinyon jay, hummingbird, red-tailed hawk, and rock wren.

Eastern Broadleaf Forest (Oceanic) Province

Bird populations are large in this region, with the most abundant breeding birds being the cardinal, tufted titmouse, and woodthrush. Important mammals include the whitetail deer, black bear, bobcat, gray fox, raccoon, gray squirrel, fox squirrel, eastern chipmunk, white-footed mouse, pine vole, shorttail shrew, and cotton mouse. Box turtles, common garter snakes, and timber rattlesnakes are characteristic reptiles.

Eastern Broadleaf Forest (Continental) Province

In this region, gray squirrel, fox squirrel, and eastern chipmunks are found in abundance. Birds include wild turkey, blue jay, tanager, grosbeaks, and ovenbirds. The cerulean warbler is common in the beech-maple forest.

Everglades Province

Mammals in this region include whitetail deer, Florida panther, black bear, raccoon, bobcat, opossum, skunk, various bats, marsh and swamp rabbits, cotton rat, and fox squirrel. Manatees inhabit estuaries and interlacing channels. Numerous species of birds are present. Characteristic lizards are the Carolina anole and the brown red-tailed skink. The American alligator, rough green snake, key rat snake, and southern Florida coral snake also inhabit the province.

Great Plains Steppe and Shrub Province

This region shares some species with the Great Plains Steppe Province (see below). No bird or mammal species is uniquely abundant.

Great Plains Steppe Province

Large mammals include antelope and coyotes. Jackrabbits are numerous on the steppe, and cottontails are present near streams and cover. Burrowing rodents include ground squirrels, prairie dogs, pocket gophers, and many smaller species. Burrowing predators include the badger and the black-footed ferret. Mourning doves are abundant in shelterbelt plantings. Sharp-tailed grouse, greater prairie chicken, and bobwhite are also present.

Great Plains-Palouse Dry Steppe Province

Antelope is most abundant; mule deer and whitetail deer are also common where brush cover is available. Whitetail and blacktail jackrabbit are found, as well as the desert cottontail. Two bird species, the mountain plover and McCown's longspur, are unique to the shortgrass prairies east of the Rockies.

Intermountain Semi-Desert and Desert Province

Few large mammals live in this region, but mule deer, mountain lion, bobcat, and badger occasionally occur. Antelope and prairie dog occur in sagebrush habitat. Other common species include ground

squirrels, jackrabbits, kangaroo mice, wood rats, and kit fox. Bird species include burrowing owl, sage sparrow, sage thrasher, American kestrel, golden eagle, ferruginous hawk, and sage grouse.

Laurentian Mixed Forest Province

Mammalian species include short-tail weasel, snowshoe hare, beaver, muskrat, black bear, striped skunk, marmot, chipmunk, and jumping mouse. Ptarmigan are present year-round; summer resident birds include the white-throated sparrow, northern junco, and yellow-bellied sapsucker.

Outer Coastal Plain Mixed Forest Province

Among the numerous bird species are the prothonotary warbler, white-eyed vireo, wood duck, yellow-billed cuckoo, Louisiana waterthrush, and all the species found in the Southeastern Mixed Province.

Prairie Parkland (Temperate) Province

Mink and river otter occupy riverine forest areas. Ground squirrels and prairie dogs are common in prairies. Birds include the belted kingfisher, bank swallow, spotted sandpiper, and green-backed heron. Upland birds include the horned lark, eastern meadowlark, and mourning dove.

Southeastern Mixed Forest Province

Whitetail deer and cottontail rabbits are widespread. Other species include fox squirrel, gray squirrel, raccoon, fox, and, in the western part of the province, the nine-banded armadillo. The eastern wild turkey, bobwhite, and mourning dove are widespread.

Southern Rocky Mountain Steppe-Open Woodland-Coniferous Forest-Alpine Meadow Province

Common large mammals include elk, deer, bighorn sheep, mountain lion, bobcat, beaver, porcupine, and black bear. Grizzly bear and moose inhabit the northern portions of the province. Small mammals include mice, squirrels, martens, chipmunks, mountain cottontails, and bushytail woodrats. Common birds include the mountain bluebird, chestnut-backed chickadee, red-breasted nuthatch, ruby-crowned kinglet, pygmy nuthatch, gray jay, Steller's jay, and Clark's nutcracker.

Southwest Plateau and Plains Dry Steppe and Shrub Province

Mexican ground squirrel and gray fox are characteristic of this province. White-tailed deer are abundant and armadillo are present. Fox squirrel, raccoon, and freetail bats also occur. Wild turkey, mourning dove, scaled quail, and bobwhite are common game birds, and several species of hawks and owls are present.

SPECIES OF SPECIAL MANAGEMENT CONCERN

As described in the "Vegetation" section, the NPS has the responsibility to address impacts on federally listed threatened, endangered, and species proposed for listing under the ESA. The terms "threatened" and "endangered" describe the official federal status of certain species as defined by the ESA.

The category 1 and 2 park units provide habitat that supports hundreds of species of animals that are threatened, endangered, or of special concern at the national, regional, and state level. Special-status species types vary widely across national park system units. Some of these species and their habitats may occur in areas suitable for oil and gas development. For instance, the federally endangered Florida panther

is present throughout southwestern Florida, including Everglades National Park and Big Cypress National Preserve. Lists of state and federally listed special-status species that are known to occur or likely to be found in category 1 and 2 park units were identified through consultation with park resource management staff and by accessing the NPS Integrated Resource Management Applications web portal, available online at <https://irma.nps.gov>. The species lists are provided in appendixes D and E. Appendix F summarizes which federally listed species are likely to occur on or near the exempt well locations within the category 1 parks, based on the site-specific vegetation cover reported on those well sites in the NPS database and the habitat preferences of the species.

VISITOR USE AND EXPERIENCE

According to the 1916 NPS Organic Act, the NPS must “conserve the scenery, natural and historic objects, and wild life in the System units and to provide for the enjoyment of the scenery, natural and historic objects, and wild life in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (54 USC 100101). Visitation varies across park units, and the amount of annual visitation a park received is a function of several factors, including its relative proximity to large population centers and popularity as a destination. Many of the category 1 and 2 parks have large numbers of seasonal and annual visitors. For example, Mesa Verde National Park received an annual high visitation in July 2012 with 98,574 recreational visits to the park (NPS 2012). Mesa Verde is considered a major tourist attraction in southwest Colorado and is also well known internationally as a result of its status as a World Heritage Site. By contrast, Washita Battlefield National Historic Site in Oklahoma had only 1,290 recreational visitors at its annual peak in May 2012 (NPS 2012). These two park units reveal the wide range of visitation at park units. Other parks have visitation that remains relatively constant throughout the year. Because of its proximity to Los Angeles and because it receives a fair amount of commuter traffic, Santa Monica Mountains National Recreation Area visitation ranged from a low of 37,606 people in December to a high of 71,444 in July 2012. Visitation during the other months of the year remained fairly constant (NPS 2012).

People visit park units for nonrecreational as well as recreational purposes. Recreational visitors target the park unit or its amenities as their destination—entering the park to enjoy the resources, vistas, or experiences. Nonrecreational visitors may select a park unit for the purpose of conducting business at the park (as in the case of contracted labor), or they may use the park roads to access another destination (such as commuters traveling through an urban park unit to and from work). In the latter case, the presence of natural resources or scenic vistas may factor into the decision to travel through the park, but the park itself is not the final destination. Examples of this form of nonrecreational park visitation include travel along roadways through Cuyahoga Valley National Park, the bridge over Obed Wild and Scenic River, and the thoroughfares within Santa Monica Mountains National Recreation Area. Table 18 shows the number of recreational and nonrecreational visits to the category 1 and 2 park units in 2012.

TABLE 18. YEAR 2012 ANNUAL VISITATION STATISTICS FOR CATEGORY 1 AND 2 PARK UNITS

Park Unit	Recreational Visits	Nonrecreational* Visits	Total Visitation
Category 1 Park Units			
Alibates Flint Quarries National Monument	3,383	0	3,383
Aztec Ruins National Monument	44,744	969	45,713
Big Cypress National Preserve	882,570	0	882,570
Big South Fork National River and Recreation Area	600,161	0	600,161

Park Unit	Recreational Visits	Nonrecreational* Visits	Total Visitation
Big Thicket National Preserve	135,262	0	135,262
Cumberland Gap National Historic Park	853,998	0	853,998
Cuyahoga Valley National Park	2,299,722	159	2,299,881
Gauley River National Recreation Area	115,283	0	115,283
Lake Meredith National Recreation Area	502,457	0	502,457
New River Gorge National River	1,128,195	2,400	1,130,595
Obed Wild and Scenic River	212,446	10,800	223,246
Padre Island National Seashore	573,855	1,800	575,655
Subtotal	7,370,994	16,128	7,387,122
Category 2 Park Units			
Bluestone National Scenic River	36,842	0	36,842
Cane River Creole National Historical Park	28,310	0	28,310
Carlsbad Caverns National Park	381,058	0	381,058
Dinosaur National Monument	302,858	732	303,590
Everglades National Park	1,141,906	2,273	1,144,179
Flight 93 National Memorial	317,926	0	317,926
Fort Necessity National Battlefield	187,893	120	188,013
Fort Union Trading Post National Historic Site	12,405	596	13,001
Friendship Hill National Historic Site	34,289	0	34,289
Glen Canyon National Recreation Area	2,061,328	22,890	2,084,218
Grand Teton National Park	2,705,256	1,213,162	3,918,418
Great Sand Dunes National Park and Preserve	254,674	470	255,144
Guadalupe Mountains National Park	159,360	0	159,360
Gulf Islands National Seashore	4,973,462	102,287	5,075,749
Hopewell Culture National Historical Park	39,462	0	39,462
Indiana Dunes National Lakeshore	1,889,381	5,253	1,894,634
Jean Lafitte National Historic Park and Preserve	419,694	192,000	611,694
Johnstown Flood National Memorial	123,081	161,555	284,636
Little River Canyon National Preserve	201,109	0	201,109
Mammoth Cave National Park	508,054	139,008	647,062
Mesa Verde National Park	488,860	9,647	498,507
Nicodemus National Historic Site	3,505	0	3,505
Palo Alto Battlefield National Historic Site	36,707	0	36,707
San Antonio Missions National Historic Park	614,810	0	614,810
Sand Creek Massacre National Historic Site	4,384	0	4,384
Santa Monica Mountains National Recreation Area	649,471	73,629	723,100
Steamtown National Historic Site	106,309	11,592	117,901

Park Unit	Recreational Visits	Nonrecreational*	Total Visitation
Theodore Roosevelt National Park	640,555	6,578	647,133
Upper Delaware Scenic and Recreational River	255,586	2,130	257,716
Washita Battlefield National Historic Site	10,615	0	10,615
Subtotal	18,589,150	1,943,922	20,533,072
TOTAL	25,960,144	1,960,050	27,920,194

*Some park units may not keep statistics on nonrecreational visitors. Consequently, the number in this column may be zero.

Source: NPS 2012.

Recreational visitors generally fall into three primary categories, as follows:

- **Passive Visitors**—Visitors stay in developed areas accessible by vehicle. Typically, these visitors would only exit their vehicles for a short period of time at an overlook or visitor center. Their stays would likely last a few hours to a day with passive or quiet use, such as visiting Flight 93 National Memorial.
- **Casual Visitors**—In addition to experiencing the park from their vehicles, or in some cases by boat, these visitors would also go on day hikes and would camp at developed campgrounds or backcountry campsites that are easily accessible. Visitors’ preferences are for socializing and maintaining a comfort and safety level that put them within easy access of modern conveniences. Lengths of stay for these visitors can be from a few hours to a few days, with casual use such as tours or hiking at Mammoth Cave National Park.
- **Active or Backcountry Visitors**—Backcountry visitors seek risks and challenges in more remote settings and rely very little on modern conveniences. These visitors seek active participation in park amenities, such as climbing in the Grand Tetons or boating in Glen Canyon National Recreation Area. They avoid visitor facilities and amenities in order to achieve a sense of self-reliance and independence. These visitors would remain in the backcountry for a few days to a week or more, camping at backcountry campsites.

Passive activities at park units can range from picnicking amid a scenic vista or walking through a historic site and contemplating significant historic events to attending a ranger-led night sky program. Casual activities can range from camping or lodging at developed park facilities and participating in self-guided day hikes or guided tours. Active visitors may pursue activities such as backpacking, climbing, or rafting that would take them away from established visitor centers. Within each park unit, visitor use areas and amenities such as visitor centers, day use areas and observation points exist in some form and are designed to accommodate the projected number and type of seasonal and annual visitors. Many park units allow for multiple uses and experience levels.

Table 19 displays the types of visitor experiences available at each of the category 1 and 2 park units, as reported by park unit administrative personnel and resource specialists. Although each park unit provides for unique experiences for all three categories of recreational visitor, this classification scheme is intended to provide some form of differentiation among park units in terms of the primacy of certain types of visitation. Distance to visitor use areas was assessed for all exempt well locations, and results are listed in appendix C.

TABLE 19. PRIMARY TYPES OF VISITOR EXPERIENCE OCCURRING AT CATEGORY 1 AND 2 PARK UNITS

Park Unit	Type of Park	Primary Type of Visitor Experience
Category 1 Park Units		
Alibates Flint Quarries National Monument	Cultural	Passive
Aztec Ruins National Monument	Cultural	Passive, Casual
Big Cypress National Preserve	Natural	Passive, Casual, Active
Big South Fork National River and Recreation Area	Natural	Casual, Active
Big Thicket National Preserve	Natural	Casual
Cumberland Gap National Historic Park	Cultural	Passive, Casual
Cuyahoga Valley National Park	Natural	Casual,
Gauley River National Recreation Area	Natural	Active
Lake Meredith National Recreation Area	Natural	Casual
New River Gorge National River	Natural	Active
Obed Wild and Scenic River	Natural	Active
Padre Island National Seashore	Natural	Casual
Category 2 Park Units		
Bluestone National Scenic River	Natural	Active
Cane River Creole National Historical Park	Cultural/ Historic	Casual
Carlsbad Caverns National Park	Natural	Casual
Dinosaur National Monument	Natural	Casual
Everglades National Park	Natural	Passive, Casual, Active
Flight 93 National Memorial	Historic	Passive
Fort Necessity National Battlefield	Historic	Casual
Fort Union Trading Post National Historic Site	Cultural/ Historic	Casual
Friendship Hill National Historic Site	Historic	Casual
Glen Canyon National Recreation Area	Natural	Active
Grand Teton National Park	Natural	Active
Great Sand Dunes National Park and Preserve	Natural	Casual, Active
Guadalupe Mountains National Park	Natural	Active
Gulf Islands National Seashore	Natural	Casual, Active
Hopewell Culture National Historical Park	Cultural	Casual
Indiana Dunes National Lakeshore	Natural	Passive, Casual, Active
Jean Lafitte National Historic Park and Preserve	Cultural/ Historic	Passive, Casual
Johnstown Flood National Memorial	Historic	Passive
Little River Canyon National Preserve	Natural	Active
Mammoth Cave National Park	Natural	Passive, Casual, Active
Mesa Verde National Park	Cultural	Casual

Park Unit	Type of Park	Primary Type of Visitor Experience
Nicodemus National Historic Site	Historic	Passive
Palo Alto Battlefield National Historic Site	Historic	Casual
San Antonio Missions National Historic Park	Historic	Passive
Sand Creek Massacre National Historic Site	Historic	Passive
Santa Monica Mountains National Recreation Area	Natural	Active
Steamtown National Historic Site	Historic	Passive
Theodore Roosevelt National Park	Natural	Casual
Upper Delaware Scenic and Recreational River	Natural	Casual
Washita Battlefield National Historic Site	Cultural/ Historic	Passive, Casual

Sources: Correspondence with park unit resource specialists; NPS oil and gas management plans and GMPs, where available.

Fewer than half of the category 1 park units provide for active visitation, whereas roughly one third of category 2 park units provide for active visitation, with the majority providing for mostly passive or casual visitation. Overall, the category 1 and 2 park units provide for mostly casual forms of visitation. Visitors to park units such as Alibates Flint Quarries National Monument in Texas or Steamtown National Historic Site in Pennsylvania would be interested in passive or casual activities such as learning about prehistoric cultures or the history of railroads and steam locomotives, respectively. By contrast, visitors to the national recreation areas, national preserves, or national seashores/lakeshores would most likely be interested in pursuing outdoor casual and active recreational activities. Big Cypress National Preserve, Big South Fork National River and Recreation Area, and Gauley River National Recreation Area are examples of places that provide visitors with opportunities for active recreational opportunities.

SCENIC VIEWS AND NIGHT SKY RESOURCES

Scenic views are an essential characteristic and resource as well as a fundamental value and in many instances a key contributing factor to the formation of many park units. Park units, including many category 1 and 2 park units considered in this EIS, represent places where visitors can experience a night sky without the interference of artificial lights. Dark night skies contribute to ecosystem health and important wildlife behaviors. Within the national park system many areas possess a high degree of scenic quality and a high level of visual sensitivity. These factors contribute to drawing an increasing number of people each year who visit the parks for sightseeing and other forms of recreation.

In general, high scenic quality within park units is a product of extraordinary topography, geology, and cultural history. Scenically diverse vistas, canyon riverways, rare and unusual geological formations, coastal ecology, unique viewsheds, and cultural manifestations all contribute to the high visual quality of individual park units. Visitor interest in and public concern for a particular area’s visual resources, an area’s high degree of public visibility, the level of use of an area by the public, and the type of visitor use that an area receives all play a part in the visual quality of a particular park unit.

Several regulatory provisions serve to protect visual quality in park units. The impetus for preserving scenic quality and visual sensitivity on NPS lands stems from the NPS Organic Act, which seeks to “conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” In addition to the Organic Act, the Clean Air Act of 1970 establishes goals for visibility in national parks, wilderness areas, and international parks. The Clean Air Act

recognizes the importance of integral vistas, which are those views perceived from within class I areas of a specific landmark or panorama located outside the boundary of the class I area. Additionally, the USEPA Regional Haze Rule of 1999 (USEPA 1999) calls for states to work together to improve visibility in all mandatory class I national parks and wilderness areas. Clear viewsheds and dark night skies are critical to wilderness character.

The NPS has identified night sky quality as a physical and ecological element of a park that represents the overall condition of the park unit or is a particularly valuable attribute of the park unit. The importance of night sky as a valuable resource is described in the NPS *Management Policies 2006*, which states that the NPS will preserve, to the greatest extent possible, the natural lightscapes of parks, including natural darkness. The agency strives to minimize the intrusion of artificial light into the night scene by limiting the use of artificial outdoor lighting. In addition, when lighting is deemed necessary, the NPS works to limit its impacts by only using it when needed, shielding it, using minimal lumen output, and directing it only to where needed. The quality of the night sky is an important resource, both due to its value to human aesthetics and the broader role it plays as a component of the natural habitat. As artificial light is added to a natural night sky via atmospheric scattering, the sky background becomes brighter and the contrast with natural features is reduced. As part of the NPS Natural Sounds and Night Skies Division, night sky monitoring is currently conducted at park units nationwide to inventory light pollution. Light pollution is considered any adverse effect of artificial light to the natural or desired condition including sky glow, glare, light trespass, light clutter, decreased visibility at night, and energy waste. To date, the NPS Night Sky Team has conducted night sky monitoring at several category 1 and 2 park units (Moore 2012). As a result of their proximity to active oil and gas drilling and production activities, some category 1 park units currently have existing sources of artificial nighttime lighting associated with oil and gas operations. These sources may include light created by natural gas burn-off operations (flares) and electric lights used during nighttime activities.

Over the past few decades, artificial lighting has spread measurably across the United States. Figure 4 demonstrates the 1996 average luminance from anthropogenic sky glow at night in the United States based on satellite imagery taken by the Air Force Defense Meteorological Satellite Program. Of particular note is an area of oil and gas development around the Bakken production region of North Dakota. Satellite imagery from 1997 (figure 5) reveals an area of naturally dark skies, while imagery from 2012 (figure 6) illustrates how oil and gas development has directly impacted night sky resources in the area through the proliferation of artificial lighting related to mineral production activities.

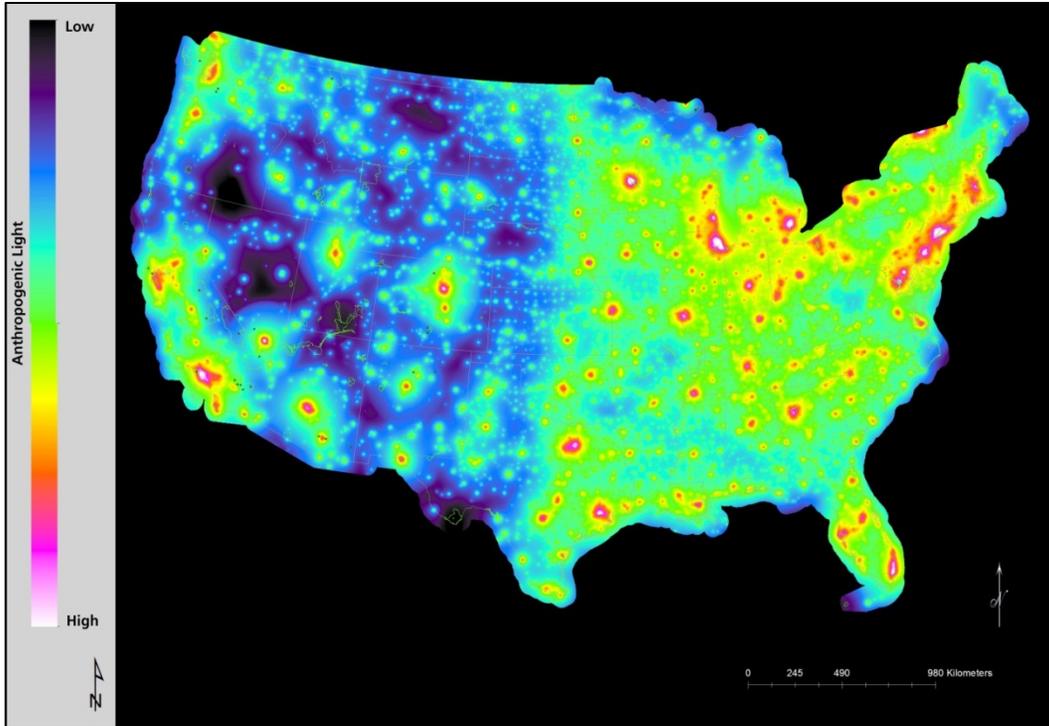


FIGURE 4. PREDICTED AVERAGE LUMINANCE FROM ANTHROPOGENIC SKY GLOW IN THE UNITED STATES

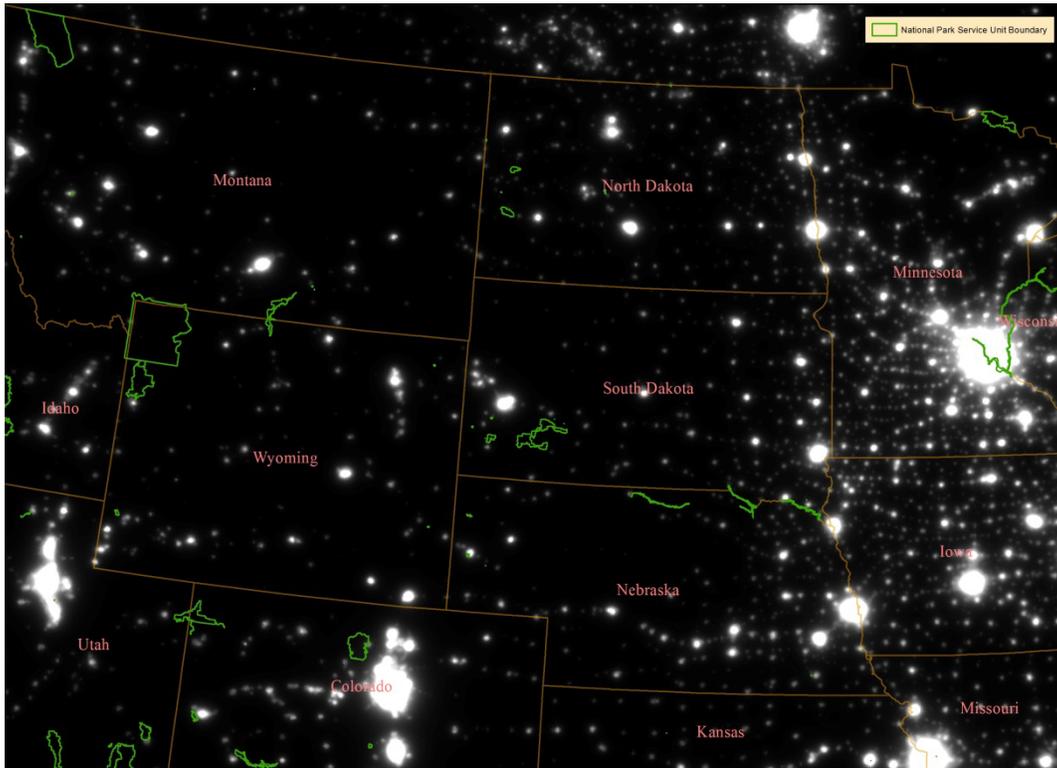


FIGURE 5. LIGHT AT NIGHT IN THE ROCKIES AND UPPER GREAT PLAINS IN 1997

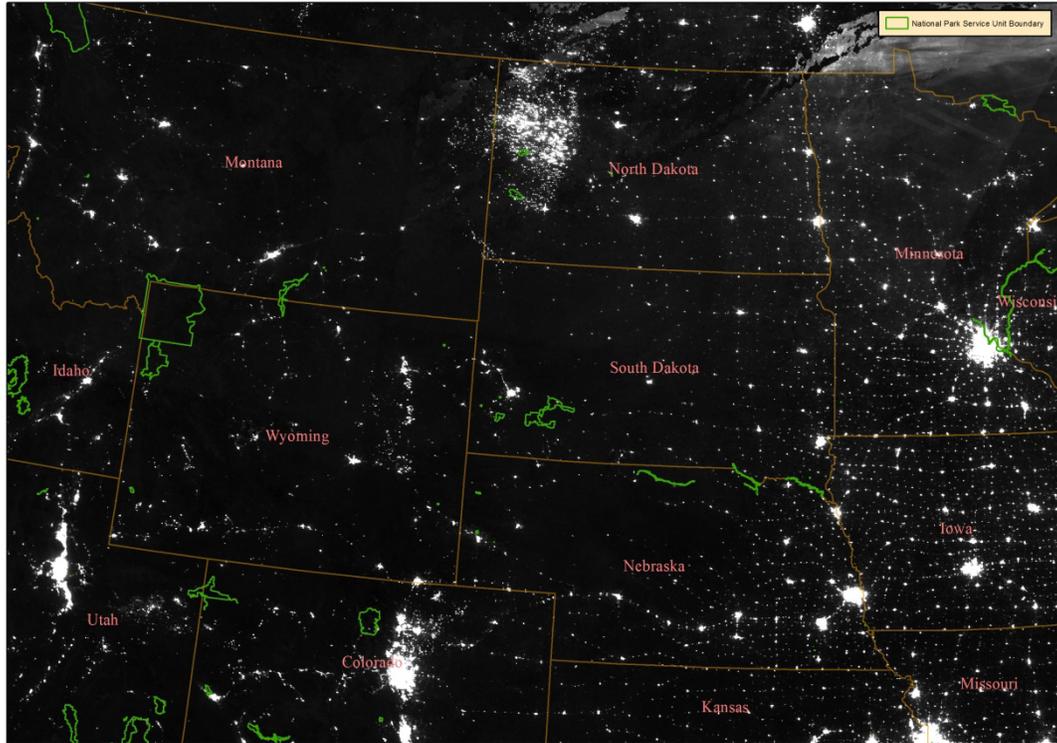


FIGURE 6. LIGHT AT NIGHT IN THE ROCKIES AND UPPER GREAT PLAINS IN 2012

NATURAL SOUNDSCAPES AND ACOUSTIC ENVIRONMENT

It is important to distinguish and define certain key terms. **Acoustic resources** are physical sound sources, including both natural sounds (wind, water, wildlife, vegetation) and cultural and historic sounds (battle reenactments, tribal ceremonies, quiet reverence). The **acoustic environment** is the combination of all the acoustic resources within a given area—natural sounds as well as human-caused sounds. The acoustic environment includes sound vibrations made by geological processes, biological activity, and even sounds that are inaudible to most humans, such as bat echolocation calls. **Soundscape** is the component of the acoustic environment that can be perceived and comprehended by the humans. The character and quality of the soundscape influence human perceptions of an area, providing a sense of place that differentiates it from other regions. **Noise** refers to sound which is unwanted, either because of its effects on humans and wildlife, or its interference with the perception or detection of other sounds. **Cultural soundscapes** include opportunities for appropriate transmission of cultural and historic sounds that are fundamental components of the purposes and values for which the parks were established.

Sound levels in national parks can vary greatly, depending on location, topography, vegetation, biological activity, weather conditions and other factors. For example, the din of a typical suburban area fluctuates between 50 and 60 decibels (dBA), while the crater of Haleakala National Park is intensely quiet, with levels around 10 dBA. Below are some examples of sound pressure levels measured in national parks.

Increases in frequency, amplitude, and duration of sound levels can impact human health, visitor experience, wildlife, and ecological systems in a variety of ways. The effects of noise on people can be classified into three general categories: (1) social/psychological effects such as annoyance, nuisance, and dissatisfaction; (2) interference with activities such as speech, sleep, and learning; and (3) physiological effects such as anxiety or hearing loss. The sound levels associated with environmental noise generally produce effects only in the first two categories. The standard measurement unit of noise is the decibel

(dB), which represents the acoustical energy present. Audible sounds range from 0 dB (threshold of human hearing at 1000 Hz) to about 140 dB (threshold of pain in humans). The normal audible frequency range for humans is approximately 20 hertz (Hz) to 20 kilohertz (kHz). For the purpose of establishing noise regulation and standards, noise levels are measured in A-weighted decibels (dBA), a logarithmic scale which approaches the sensitivity of the human ear across the frequency spectrum. Noise thresholds are provided by various agencies for specific activities such as snowmobiles (NPS) hearing protection on worksites (Occupational Safety and Health Administration) and sound levels in classrooms (USEPA). To provide a frame of reference, refer to table 20.

TABLE 20. COMMON SOUNDS SOURCES AND DECIBEL LEVELS AT VARIOUS PARK UNITS

Decibel level (dBA)	Sound Source	Decibel level (dBA)	Sound Source
10	Volcano crater (Haleakala National Park)	80	Snowcoach at 30 m (Yellowstone National Park)
20	Leaves rustling (Canyonlands National Park)	100	Thunder (Arches National Park)
40	Crickets at 5 m (Zion National Park)	120	Military jet, 100 m above ground level (Yukon-Charley Rivers National Park)
60	Conversational speech at 5 m (Whitman Mission National Historic Site)	126	Cannon fire at 150 m (Vicksburg National Military Park)

The acoustic environment is a natural resource that is integral to wildlife communication, behavior, and many other ecological processes. Exposure to relatively high noise levels that typically occur close to a source can produce potentially harmful physiological responses in humans and other animals including hearing loss, elevated stress hormone levels, and hypertension. Even low levels of noise can interfere with ecological processes in surprising and complex ways. When ambient sound levels are increased, the listening area for wildlife is reduced. A reduction in wildlife communication distance created by noise might decrease the effectiveness of social behaviors such as predator detection, prey location, mating, and migration. Preserving the acoustic environment and natural sounds of such areas are critical to effective wilderness management and can have important effects on wilderness character. Natural soundscapes and the absence of anthropogenic noise are crucial components of the wilderness qualities of solitude, naturalness, untrammeled, and undeveloped character.

As was reported to Congress in the *Report on the Effects of Aircraft Overflights on the National Park System* (NPS 1994), a system-wide survey of park visitors revealed that nearly as many visitors come to national parks to enjoy the natural soundscape (91 percent) as come to view the scenery (93 percent). For many visitors the ability to hear clearly the delicate and quieter intermittent sounds of nature, the ability to experience interludes of extreme quiet for their own sake, and the opportunity to do so for extended periods of time are important reasons for visiting national parks and one of the driving forces behind the development of this plan. These experiences are important reasons for preserving and visiting national parks.

Typical sources of noise within park units and surrounding areas include trucks and automobiles, aircraft, boat motors, motorcycles, all-terrain vehicles, various types of equipment (e.g., tractors, log skidders and feller bunchers, chainsaws, lawn mowers, oil and gas artificial lift equipment, compressors, and others), high-voltage power lines and transformers, and firearms. Sources of noise within park units are often localized and/or seasonal in duration. High altitude aircraft and roadway noise are pervasive in all seasons and throughout the day.

NOISE FROM OIL AND GAS OPERATIONS

Typical noise sources associated with oil and gas exploration, development and production include, but are not limited to, compressor stations, pumping units, fuel and water trucks, cranes for hoisting rigs, and concrete pumps used during drilling (La Plata County 2002). Noise levels measured at a distance of 50 feet from the source of oil and gas operations have been reported to be approximately 83 dBA for well drilling and pump jack operations, 71 dBA for produced water injection facilities, and 89 dBA for gas compressor facilities (BLM 2000).

Noise decreases by 6 dB with the doubling of distance from the source under “hard” surface conditions (no intervening ground attenuation) (Caltrans 1998). For example, without considering any attenuation from intervening vegetation or topography, a noise source of 83 dB at a well drilling site (measured within 50 feet of the equipment) would decrease to 35 dB at a distance of 6,400 feet from the site (table 21).

TABLE 21. NOISE DISSIPATION AS A FUNCTION OF INCREASING DISTANCE FROM THE SOURCE

Distance from Source (feet)	Well Drilling (83 dB at 50 feet) Hard Surface Attenuation of 6 dB with Doubling of Distance	Well Drilling (83 dB at 50 feet) Soft Surface Attenuation of 7.5 dB with Doubling of Distance	Gas Compressor Facilities (8 dB at 50 feet) Soft Surface Attenuation of 7.5 dB with Doubling of Distance
50	83	83	89
100	77	75.5	81.5
200	71	68	74
400	59	60.5	66.5
800	53	53	59
1600	47	45.5	51.5
3200	41	38	44
6400	35	30.5	36.5

NATURAL AMBIENT CONDITIONS AT CATEGORY 1 AND 2 PARK UNITS

NPS *Management Policies 2006* state, “the natural ambient sound level—that is, the environment of sound that exists in the absence of human-caused noise—is the baseline condition, and the standard against which current conditions in a soundscape will be measured and evaluated.” Table 22 shows measured natural ambient sound levels (L_{nat}) at category 1 and 2 park units where acoustical measurements have been made and acoustical data exist.

TABLE 22. MEASURED NATURAL AMBIENT CONDITIONS AT CATEGORY 1 AND 2 PARK UNITS

Park Unit	Category	L_{nat} Night	L_{nat} Day
Big Thicket National Preserve (Beach Creek Unit)	1	20.7	28.4
Glen Canyon National Recreation Area	2	20.2*	36.6*
Great Sand Dunes National Park and Preserve	2	8.7*	17*
Lake Meredith National Recreation Area	1	27.2*	31.3*
Everglades National Park	2	38.6*	34.7*

* Level is based on L_{90} exceedance value (sound level that is exceeded 90% of the time)

For parks where acoustical measurements have not been made, alternative strategies exist for estimating natural ambient sound levels. The Natural Sounds and Night Skies Division has developed a geospatial model of sound levels in the continental United States using acoustical measurements from 244 sites as well as 109 explanatory variables such as location, climate, landcover, hydrology, wind speed, and proximity to noise sources such as roads, railroads, and airports. The resulting model predicts daytime existing sound levels anywhere in the contiguous United States during a typical summer day, and can also estimate how much lower these sound levels would be in the absence of human activities (Mennitt et al. 2013).

The metrics in table 23 report average daytime (07:00:00 – 18:59:59) natural ambient sound level (L_{nat}) measurements for category 1 and category 2 park units.

TABLE 23. MODELED MINIMUM, MEAN, AND MAXIMUM NATURAL AMBIENT DAYTIME SOUND LEVELS (IN DBA) FOR CATEGORY 1 AND CATEGORY 2 PARKS

	Minimum	Mean	Maximum
Category 1	25.3	34.3	39.4
Category 2	23.6	33.0	39.0

The values in table 23 provide estimates of natural ambient conditions in category 1 and 2 park units to provide guidance on expected daytime conditions for summer months. As shown in table 24, ambient sound levels do fluctuate considerably between parks. Furthermore, natural ambient sound levels are often lower at night (Lynch, Joyce, and Fristrup 2011) and during winter months.

TABLE 24. MODELED MINIMUM, MEAN, AND MAXIMUM NATURAL AMBIENT DAYTIME SOUND LEVELS (IN DBA) FOR CATEGORY 1 AND CATEGORY 2 PARKS

Park Unit	Minimum	Mean	Maximum
Category 1 Park Units			
Alibates Flint Quarries National Monument	30.3	30.8	32.2
Aztec Ruins National Monument	25.3	26.1	29.2
Big Cypress National Preserve	35.2	36.9	37.3
Big South Fork National River and Recreation Area	34.5	36.9	39.4
Big Thicket National Preserve	34.3	36.6	39.1
Cumberland Gap National Historic Park	31.9	34.7	37.4
Cuyahoga Valley National Park	33.2	35.6	38.1
Gauley River National Recreation Area	34.2	36.0	38.2
Lake Meredith National Recreation Area	30.0	31.5	34.2
New River Gorge National River	33.4	35.0	38.1
Obed Wild and Scenic River	35.3	38.1	39.0
Padre Island National Seashore	34.4	35.9	37.1
Category 2 Park Units			
Bluestone National Scenic River	34.0	35.5	37.5
Cane River Creole National Historical Park	34.6	35.0	36.5

Park Unit	Minimum	Mean	Maximum
Carlsbad Caverns National Park	29.3	30.7	32.8
Dinosaur National Monument	24.8	28.2	32.8
Everglades National Park	35.6	36.7	38.3
Flight 93 National Memorial	32.9	33.5	34.3
Fort Necessity National Battlefield	33.2	33.7	34.3
Fort Union Trading Post National Historic Site	28.9	30.5	31.8
Friendship Hill National Historic Site	34.2	35.5	36.49
Glen Canyon National Recreation Area	24.3	26.6	33.0
Grand Teton National Park	27.0	30.3	38.4
Great Sand Dunes National Park and Preserve	23.6	27.1	36.7
Guadalupe Mountains National Park	28.1	29.7	33.1
Gulf Islands National Seashore	34.6	36.3	38.2
Hopewell Culture National Historical Park	34.0	35.8	37.6
Indiana Dunes National Lakeshore	33.1	34.8	37.2
Jean Lafitte National Historic Park and Preserve	34.9	36.6	37.2
Johnstown Flood National Memorial	33.2	33.5	33.9
Little River Canyon National Preserve	34.4	36.9	38.8
Mammoth Cave National Park	34.2	36.7	39.0
Mesa Verde National Park	25.5	27.7	31.1
Nicodemus National Historic Site	32.7	32.7	32.7
Palo Alto Battlefield National Historic Site	33.9	34.1	35.4
San Antonio Missions National Historic Park	34.5	35.2	36.5
Sand Creek Massacre National Historic Site	28.59	30.6	32.0
Santa Monica Mountains National Recreation Area	29.9	31.6	34.8
Steamtown National Historic Site	35.2	35.2	35.3
Theodore Roosevelt National Park	28.3	30.6	34.4
Upper Delaware Scenic and Recreational River	32.8	34.7	36.6
Washita Battlefield National Historic Site	32.4	33.4	34.4

CULTURAL RESOURCES

The National Historic Preservation Act of 1966 (as amended) (NHPA) is the principal legislative authority for managing cultural resources associated with NPS projects. Generally, section 106 of the NHPA requires all federal agencies to consider the effects of their actions on cultural resources listed on or determined eligible for listing on the National Register of Historic Places (National Register). In addition, federal agencies must minimize harm to historic properties that would be adversely affected by a federal undertaking. Section 110 of the NHPA requires federal agencies to establish preservation programs for the identification, evaluation, and nomination of historic properties to the National Register.

Cultural resources, which are defined as the material evidence of past human activities, are found in nearly every park in the national park system. The NPS defines four categories of cultural resources that could be affected by oil and gas development. These are described in the NPS Cultural Resource Management Guidelines (NPS 1998) and NPS *Management Policies 2006* (NPS 2006a), which identify four types of cultural resources: archeological resources, cultural landscapes, historic/prehistoric structures, and ethnographic resources. These are described in further detail below.

Archeological Resources—Archeological resources are the remains of past human activity and records documenting the scientific analysis of these remains, including the record of the effects of human activities on the environment. An archeological resource is capable of revealing scientific or humanistic information through archeological research. Archeological resources can show the spread of ideas over time and the development of settlements from place to place. Many parks have inventoried some of their lands for archeological resources, but many of these resources (especially subsurface resources) have not yet been identified and may occur in areas where oil and gas development is occurring or in areas proposed for oil and gas development.

Cultural Landscapes—Cultural landscapes are settings that humans have created in the natural world. A cultural landscape is a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. There are four general types of cultural landscapes, not mutually exclusive: historic sites, historic designed landscapes, historic vernacular landscapes, and ethnographic landscapes. The NPS conducts cultural landscape inventories and/or reports across the system to identify and manage landscapes.

Historic/Prehistoric Structures—Structures are material assemblies that extend the limits of human capability. Structures can be buildings, bridges, temple mounds, fishing vessels, auto factories, locomotives, and bronze statues. The NPS maintains a List of Classified Structures, a computerized inventory of historic and prehistoric structures in which the NPS has legal interest. These structures are either listed in, or are eligible for listing in, the National Register, or the structure is a contributing element of a historic site or district.

Ethnographic Resources—Ethnographic resources are basic expressions of human culture and the basis for continuity of cultural systems. These items include objects and places, including sites, structures, landscapes, and natural resources, with traditional cultural meaning and value to associated peoples. Research and consultation with associated people identifies and explains the places and things they find culturally meaningful. Ethnographic resources eligible for the National Register are called traditional cultural properties.

Of the category 1 and 2 park units, 18 were created primarily as cultural resource parks (i.e., their enabling legislation and park purpose/significance descriptions focus on the cultural resources contained within them). In category 1, these include 3 park units; in category 2, there are 14 of these park units. These are identified in table 25. For example, Alibates Flint Quarries National Monument was created to preserve and interpret archeological sites and prehistoric quarrying activities by early Native Americans for material to make stone tools. Washita Battlefield National Historic Site is considered a cultural landscape because it protects and interprets the setting along the Washita River where Lieutenant Colonel George A. Custer led the 7th U.S. Cavalry on an attack against the Southern Cheyenne village of Peace Chief Black Kettle on November 27, 1868. Aztec Ruins National Monument and Chaco Culture National Historical Park are examples of prehistoric structures which represent centers of ancestral Pueblo Native American society. Jean Lafitte National Historic Park and Preserve contains historic structures, cemeteries, and battlefields within its six sites. Ethnographic resources play a large part in Cane River

National Historical Park because of its association with both Creole people lifeways and religious systems and African-American cultural identity.

Even parks that were created primarily for their natural resources have substantial cultural resources that are important to the history of the park and the nation. Park units such as Upper Delaware Scenic and Recreational River, for example, are created for their natural amenities but also have archeological remains, historic structures, and cultural landscapes. Examples of historic sites at park units that are not considered primarily cultural resource parks include the remains of line camps related to family ranching and a Mexican-American war military campsite at Padre Island National Seashore. At Theodore Roosevelt National Park, Maltese Cross Cabin was Theodore Roosevelt’s first home in Dakota Territory (1883 to 1884). He returned the next year and established the Elkhorn Ranch. Roosevelt stated, “I never would have been President if it had not been for my experiences in North Dakota.”

The types of cultural resources at each of the category 1 and 2 park units differ and are subject to regional and local influences. As previously mentioned, some of the parks may hold yet undiscovered cultural resources, especially archeological resources. However, all of the category 1 and 2 park units, even those created primarily as recreation areas or based on their natural resource features, have cultural resources present in some form, if only as potential archeological resources. Table 25 shows the potential types of cultural resources present at each park unit. Asterisks in the table denote park units established specifically to protect and interpret cultural and historic resources or historic events. Many of the parks have resources listed in, or eligible for listing in, the National Register. Also, distance to cultural resources was assessed for all exempt well locations having this information in GIS format, and results are listed in appendix C.

TABLE 25. POTENTIAL TYPES OF CULTURAL RESOURCES WITHIN CATEGORY 1 AND 2 PARK UNITS

Park Unit	Archeological Resources	Cultural Landscapes	Historic/ Prehistoric Structures	Ethnographic Resources
Category 1 Park Units				
*Alibates Flint Quarries National Monument	X	X		X
*Aztec Ruins National Monument	X	X	X	X
Big Cypress National Preserve	X		X	X
Big South Fork National River and Recreation Area	X	X	X	
Big Thicket National Preserve	X			X
*Cumberland Gap National Historic Park	X	X	X	X
Cuyahoga Valley National Park	X	X	X	
Gauley River National Recreation Area	X		X	X
Lake Meredith National Recreation Area	X			
New River Gorge National River	X	X	X	X
Obed Wild and Scenic River	X		X	
Padre Island National Seashore	X	X	X	X
Subtotal	12	7	9	8

Park Unit	Archeological Resources	Cultural Landscapes	Historic/ Prehistoric Structures	Ethnographic Resources
Category 2 Park Units				
Bluestone National Scenic River	X	X	X	X
*Cane River Creole National Historical Park	X	X	X	X
Carlsbad Caverns National Park	X			
Dinosaur National Monument	X			
Everglades National Park	X	X	X	X
*Flight 93 National Memorial		X		
*Fort Necessity National Battlefield	X	X	X	
*Fort Union Trading Post National Historic Site	X	X	X	X
*Friendship Hill National Historic Site	X	X	X	
Glen Canyon National Recreation Area	X		X	
Grand Teton National Park	X	X	X	X
Great Sand Dunes National Park & Preserve	X	X	X	X
Guadalupe Mountains National Park	X		X	
Gulf Islands National Seashore	X	X	X	X
*Hopewell Culture National Historical Park	X	X		
Indiana Dunes National Lakeshore	X	X	X	X
*Jean Lafitte National Historic Park & Preserve	X	X	X	X
*Johnstown Flood National Memorial	X	X	X	
Little River Canyon National Preserve	X			
Mammoth Cave National Park	X		X	X
*Mesa Verde National Park	X	X	X	
*Nicodemus National Historic Site		X	X	X
*Palo Alto Battlefield National Historic Site	X	X		
*San Antonio Missions National Historical Park	X	X	X	X
Sand Creek Massacre National Historic Site				
Santa Monica Mountains National Recreation Area	X	X	X	X
*Steamtown National Historic Site	X		X	
Theodore Roosevelt National Park	X		X	X
Upper Delaware Scenic and Recreational River	X	X	X	X
*Washita Battlefield National Historic Site	X	X		X
Subtotal	27	21	22	16
TOTAL	39	28	31	24

*Denotes park units established specifically to protect and interpret cultural and historic resources or historic events. Sources: NPS oil and gas management plans and GMPs, where available; correspondence with park unit resource specialists.

PARK MANAGEMENT AND OPERATIONS

Park operations refer to the adequacy of staffing levels and the quality and effectiveness of park infrastructure in protecting and preserving vital resources and providing for an effective visitor experience. Park operations can encompass, but are not limited to, visitor services, resource stewardship, concessions, fire management, maintenance, administration, research and monitoring, and law enforcement. Park facilities include visitor orientation facilities (visitor centers, developed and interpreted sites, and other interpretive features); visitor amenities (including lodging and food service, campgrounds, day use areas, and amphitheaters); administrative buildings (park staff offices and workspace); roads that provide access to and within the park (for administrative, visitor, and emergency use); housing for staff required to work and live in the park; management-support facilities (garages, shops, storage buildings and yards used to house and store equipment, tools, and materials); and utilities (phones, sewer, water, and electricity).

Each park unit has amenities and operations commensurate with the size and type of park. For example, a park the size of Santa Monica Mountains National Recreation Area has many more roads and maintenance facilities than a smaller park unit such as the Flight 93 National Memorial. Related to this programmatic EIS, specific features within the park units for which the NPS is responsible and which could be affected by the proposed rule revisions include visitor amenities, utilities, park roads and turnouts, parking areas, overlooks, and trails, as well as natural and cultural resource management and protection.

ADMINISTRATION OF NON-FEDERAL OIL AND GAS REGULATIONS

Management of the oil and gas program in park units within the national park system is accomplished by park staff with technical support from resource and program specialists in the seven regional offices (Alaska, Midwest, Intermountain, Pacific West, Northwest, National Capital, and Southeast) and the Washington Office National Resource Program Center (located in Denver and Fort Collins, Colorado). The majority of fieldwork and coordination with individual oil and gas operators is performed by field staff at each of the park units. These field staff typically also have other tasks to perform as part of their regular duties.

Each of the category 1 park units incorporates oil and gas operations into its overall park operations, either with park unit full-time equivalent (FTE) employees, regional personnel support, or assistance from staff of the NPS Geologic Resources Division (GRD). Table 26 shows the 12 category 1 park units and the manner in which they manage oil and gas.

The NPS has no regulatory authority to accrue fees for the use of parklands by operators under the current non-federal oil and gas regulatory program or for the management of its 9B regulations. Although the NPS encourages operators to adaptively reuse disturbed areas for siting new operations where appropriate, the NPS cannot require operators to do so, and prospective operators normally do not choose to site operations where they may assume liability for any necessary cleanup or remediation of existing soil contamination. In cases where site reclamation is needed and valid operators are still in existence, the NPS can request the operator's voluntary return to reclaim their previous operations areas. In most cases, however, well sites were plugged and abandoned prior to the implementation of the 9B regulations, and the NPS lacks the regulatory authority to require further reclamation by the operator. The NPS does have funding available to remediate contaminated sites. However, in cases where no valid operators can be found, or where operators do not voluntarily return to reclaim these sites, individual park units must compete for NPS funding dedicated to reclaiming disturbed lands and abandoned mine lands.

Existing wells that are currently exempt from 9B regulations are listed in appendix C, which contains an accounting of these operations as well as associated resource information gathered in order to provide the basis for site-specific impacts analysis provided in chapter 4.

TABLE 26. PARK OPERATIONS WITH RESPECT TO OIL AND GAS IN CATEGORY 1 PARK UNITS

Park Unit	Staffing	Responsibilities
Alibates Flint Quarries National Monument	Lake Meredith National Recreation Area Chief of Resource Management	Addressing management issues involved with the one grandfathered oil and gas well present within the park.
Aztec Ruins National Monument	Chief of Resource Management	All oil and gas operations.
Big Cypress National Preserve	One full-time minerals management specialist, one hydrology technician and one hydrologist	Minerals management specialists responsible for regulatory oversight and serves as the Resource Management Oil Spill Coordinator and Acting Oil and Gas Coordinator to the Southeast region, handles operations review. Both the hydrology technician and hydrologist assist in regulatory and operations review aspects.
Big South Fork National River and Recreation Area	3 full-time positions; a geologist and biological science technician were hired in 2009 and one permanent position is presently vacant.	Inspecting existing oil and gas operations; coordinating with state environmental programs to ensure operations are in compliance with state regulations; coordinating plugging and reclamation of orphaned wells; monitoring park resources in the vicinity of oil and gas sites; coordinating with NPS technical staff to ensure wells meet 9B regulations; and coordinating with operators for development of plans of operations.
Big Thicket National Preserve	One full-time oil and gas program manager with support from park resource management staff	Oversees oil and gas operations.
Cumberland Gap National Historic Park	Uses GRD staff with assistance from staff at Big South Fork National River and Recreation Area	Addressing management issues involved with oil and gas wells.
Cuyahoga Valley National Park	Park biologist, with technical assistance from GRD staff	Monitoring oil and gas well operations and for oil and gas contracts.
Gauley River National Recreation Area	One resource management staff, with assistance from GRD staff	Addressing management issues involved with oil and gas wells.
Lake Meredith National Recreation Area	Chief of Resource Management	Addressing management issues involved with oil and gas wells.
New River Gorge National River	One resource management staff, with assistance from GRD staff.	Addressing management issues involved with oil and gas wells.
Obed Wild and Scenic River	Oil and gas issues managed by Big South Fork National River and Recreation Area staff with assistance from region and Washington Support Office as needed.	Staff are responsible for guiding the resource protection issues that are deemed important for the Obed Wild and Scenic Rivers. This group is managed jointly with the Resource Management staff at Big South Fork National River and Recreation Area.
Padre Island National Seashore	Part-time responsibility of various staff	Addressing management issues involved with oil and gas wells.

Sources: Correspondence with park unit resource specialists; NPS oil and gas management plans and GMPs, where available.

SOCIOECONOMICS

Non-federal oil and gas development is currently being conducted in 12 national park units within the authorized boundaries established by Congress. A total of 534 non-federal oil and gas wells are located within these park boundaries (see table 2 in chapter 1). However, specific regulatory provisions in the current 9B regulations grant exemptions to 319 (about 60 percent) of these non-federal oil and gas wells located within the authorized boundaries of the affected parks. The remaining 215 oil and gas operations are currently subject to a plan of operations and performance bonding requirements.

These 215 currently regulated operations occur in 7 category 1 parks units, including Lake Meredith National Recreation Area (133 operations); Big Thicket National Preserve (37 operations); Big Cypress National Preserve (20 operations); Padre Island National Seashore (14 operations); Alibates Flint Quarries National Monument (5 operations); Aztec Ruins National Monument (3 operations); and Cuyahoga Valley National Park (3 operations). Big Cypress National Preserve, Alibates Flint Quarries National Monument, and Padre Island National Seashore are the only category 1 parks with currently regulated operations and no exempt operations.

The 534 non-federal oil and gas operations are conducted by 98 different operators. Of these, only 8 operators do not qualify as small businesses because they employ over 500 persons. All 15 access exempt operators are small entities, and 52 of the 54 operators with grandfathered wells are small entities. Eight small entities operate both grandfathered and access exempt wells (table 27). Small entities operate an average of 5 wells each while large entities operate an average of 18 wells each. The total number of small businesses that may be affected by this rulemaking is 90 businesses.

According to the U.S. Census Bureau, there are over 21,000 small U.S. businesses engaged in the “Mining, quarrying, and oil and gas extraction” sector. Of these, 8,100 small businesses are registered in the five states (New Mexico, Ohio, Tennessee, Texas, and West Virginia) where small businesses operate in units of the national park system (U.S. Census Bureau 2007). Ninety businesses represent approximately 1 percent of local businesses in the mining and oil and gas sector in the five states. Table 27 provides a summary of business types, the numbers of wells they operate, and their regulatory status.

TABLE 27. BUSINESS SUMMARY OF WELLS AND REGULATORY STATUS

Regulatory Status	Small Entity		Large Entity	
	No. of Operators	No. of Operations	No. of Operators	No. of Operations
Grandfathered	52	198	2	43
Access Exempt	15	78	-	-
Regulated	25	118	6	97

Source: U.S. Economic Census 2007.

Current 9B regulations require each oil and gas operator to develop a plan of operations that outlines the specific location, process, protection measures, and other information that will be employed during oil and gas drilling, production, and plugging and reclamation activities. As part of the plan of operations, mitigation measures have been developed to minimize or eliminate the impacts on park resources and visitors for all regulated operations within park boundaries.

OIL AND GAS DRILLING AND PRODUCTION

This section provides information on the oil and gas production within the category 1 park units, state oil and gas production, and number of drilling rigs and wells in states that have either category 1 or 2 park units. A change in NPS oil and gas rules would most likely affect those areas where there are active operations in park units.

In total, annual oil and gas operations, either currently regulated or exempt, account for 6.2 MMcf (MMcf = 1,000,000 cubic feet) and 614,000 barrels of oil. Production by park is shown in table 28. Production by park was estimated using various techniques. Where possible, individual well production figures are provided. If they were unavailable, average well production from the relevant county or district was used to estimate production per well.

TABLE 28. NUMBER OF CURRENT OPERATIONS, PRODUCTION, AND OPERATORS BY PARK

Park Unit	Grandfathered / Access-exempt / Currently Regulated Operations	Number of Producing Wells	Annual Oil Production from Current Operations (Barrels)	Annual Natural Gas Production from Current Operations (MMcf)	Number of Operators
Alibates Flint Quarries	0 / 0 / 5	5	2,920	164	1
Aztec Ruins National Monument	1 / 0 / 3	4	365	262	2
Big Cypress National Preserve	0 / 0 / 20	8	535,455	43	1
Big Thicket National Preserve	0 / 2 / 37	20	36,500	730	16
Big South Fork National River and Recreation Area	98 / 54 / 0	88	14,600	88	72
Cumberland Gap National Historical Park	2 / 0 / 0	2	-	18	1
Cuyahoga Valley National Park	66 / 21 / 3	92	5,475	135	21
Gauley River National Recreation Area	28 / 0 / 0	13	-	51	3
Lake Meredith National Recreation Area	41 / 0 / 133	150	18,250	4,745	17
New River Gorge National River	1 / 0 / 0	0	-	-	1
Obed Wild and Scenic River	4 / 1 / 0	2	365	-	2
Padre Island National Seashore	0 / 0 / 14	4	-	-	2

Production by park for currently regulated and exempt operations is shown in table 29. These figures were based on the proportion of currently regulated and exempt wells in each park. Park production for currently regulated and exempt operations is provided as a percentage of the associated state (or multiple states) production in table 30.

Table 31 provides the number of producing wells within the category 1 park units, the relevant states, and the number of drill rigs operating in each state. These figures provide a context for the oil and gas activity in the park relative to oil and gas activity at the state level. In general, park production and drilling activity represents a very small percentage of overall oil and gas activities within the associated state. All regulated and exempt production by park accounts for less than 0.6 percent of the associated state's production. The exception is Big Cypress National Preserve, which accounts for 26.5 percent of Florida's oil production. Generally, the oil and gas operations within park boundaries are located in regions with considerable oil and gas activity.

TABLE 29. PRODUCTION FROM CURRENT OPERATIONS

Park Unit	State(s)	Annual Oil Production from Currently Regulated Operations (Barrels)	Annual Natural Gas Production from Currently Regulated Operations (MMcf)	Annual Oil Production from Exempted Operations (Barrels)	Annual Natural Gas Production from Exempted Operations (mcf)
Alibates Flint Quarries	TX	2,920	164	-	-
Aztec Ruins National Monument	NM	274	196	91	65
Big Cypress National Preserve	FL	535,455	43	-	-
Big Thicket National Preserve	TX	34,628	693	1,872	37
Big South Fork National River and Recreation Area	KY, TN	-	-	14,600	88
Cuyahoga Valley National Park	OH	183	5	5,293	131
Cumberland Gap National Historical Park	KY, TN, VA	-	-	-	18
Gauley River National Recreation Area	WV	-	-	-	51
Lake Meredith National Recreation Area	TX	13,950	3,627	4,300	1,118
New River Gorge National River	WV	-	-	-	-
Obed Wild and Scenic River	TN	-	-	365	-
Padre Island National Seashore	TX	-	-	-	-

TABLE 30. PRODUCTION FROM CURRENT OPERATIONS AS A PROPORTION OF THE ASSOCIATED STATE PRODUCTION (2012)

Park Unit	State(s)	State(s) Marketed Gas Production (MMcf)	State(s) Oil Production (millions of barrels of oil)	Percent of State			
				Annual Oil Production from Currently Regulated Operations	Annual Natural Gas Production from Currently Regulated Operations	Annual Oil Production from Exempted Operations	Annual Natural Gas Production from Exempted Operations
Alibates Flint Quarries	TX	7,240,315	531,524	0.0%	0.0%	0.0%	0.0%
Aztec Ruins National Monument	NM	1,237,303	71,274	0.0%	0.0%	0.0%	0.0%
Big Cypress National Preserve	FL	15,125	2,023	26.5%	0.3%	0.0%	0.0%
Big Thicket National Preserve	TX	7,240,315	531,524	0.0%	0.0%	0.0%	0.0%
Big South Fork National River and Recreation Area	KY, TN	129,094	2,571	0.0%	0.0%	0.6%	0.1%
Cuyahoga Valley National Park	OH	78,858	4,853	0.0%	0.0%	0.1%	0.2%
Cumberland Gap National Historical Park	KY, TN, VA	280,188	2,582	0.0%	0.0%	0.0%	0.0%
Gauley River National Recreation Area	WV	394,125	2,146	0.0%	0.0%	0.0%	0.0%
Lake Meredith National Recreation Area	TX	7,240,315	531,524	0.0%	0.1%	0.0%	0.0%
New River Gorge National River	WV	394,125	2,146	0.0%	0.0%	0.0%	0.0%
Obed Wild and Scenic River	TN	4,851	245	0.0%	0.0%	0.1%	0.0%
Padre Island National Seashore	TX	7,240,315	531,524	0.0%	0.0%	0.0%	0.0%

Source: U.S. Energy Information Administration 2013.

TABLE 31. NUMBER OF PRODUCING WELLS AND DRILL RIGS IN OPERATION

Park Unit	State(s)	Number of Producing Wells for Regulated and Exempt Operations	State Number of Producing Natural Gas Wells (2011)	State Number of Producing Oil Wells (2009)	Number of Operating Drill Rigs in State (2012)
Alibates Flint Quarries	TX	5	32,302	16,498	916
Aztec Ruins National Monument	NM	4	32,302	16,498	85
Big Cypress National Preserve	FL	10	0	54	1
Big Thicket National Preserve	TX	20	100,966	141,562	916
Big South Fork National River and Recreation Area	KY, TN	88	14,842	50,043	3
Cumberland Gap National Historical Park	OH	2	46,717	11,242	16
Cuyahoga Valley National Park	KY, TN, VA	92	22,745	5,049	4
Gauley River National Recreation Area	WV	14	56,813	3,377	26
Lake Meredith National Recreation Area	TX	149	100,966	141,562	916
New River Gorge National River	WV	0	56,813	3,377	26
Obed Wild and Scenic River	TN	4	210	205	0
Padre Island National Seashore	TX	0	56,813	3,377	916

Source: Baker Hughes Drill Rig Counts 2013; U.S. Energy Information Administration 2013.

OIL AND GAS ECONOMIC CONTRIBUTIONS TO LOCAL ECONOMIES

Oil and gas exploration and development support jobs and income in nearby communities for drill rig operators, geophysical seismic companies, construction companies, landmen, and oil and gas support companies that hydraulically fracture and complete wells, among others. Oil and gas production supports industry jobs, including inspecting and maintaining equipment and operations, complying with mitigation standards in terms of vegetation, erosion, and other on-going production and operational needs. These residential and nonresidential workers spend their wages in local and regional communities, supporting local businesses, downstream jobs and income. Oil and gas production also provides economic benefits to oil and gas companies, benefiting economies where these companies are headquartered and the nation overall. Many energy-related jobs provide higher wages and earnings than service sector jobs.

During production, the oil and gas value of production is often taxed through severance taxes and ad valorem taxes, although these taxes vary by state. Additionally, local governments often benefit from property and sales and use taxes on oil and gas equipment. These tax receipts typically benefit state and county agencies, providing funding for schools, roads, social services, and other public service and

infrastructure. Other potential social and economic linkages with local oil and gas production include contributions to tax revenues and royalty income for private mineral rights owners.

Table 32 provides the severance tax receipts for applicable states with category 1 and 2 park units. Data is not available if receipts were less than 1 percent of state tax receipts or if there is no severance tax levied.

TABLE 32. 2012 SEVERANCE TAX RECEIPTS FOR STATES WITH CATEGORY 1 AND 2 PARK UNITS

State	Severance Tax Receipts (thousands)
Alabama	\$116,467
California	\$37,112
Colorado	\$175,090
Florida	\$49,860
Indiana	\$2,212
Kansas	\$132,907
Kentucky	\$346,050
Louisiana	\$885,982
Mississippi	\$116,378
New Mexico	\$768,106
North Dakota	\$3,187,112
Ohio	\$10,182
Oklahoma	\$848,947
Pennsylvania	–
Tennessee	\$2,450
Texas	\$3,655,582
Utah	\$107,075
Virginia	\$1,986
West Virginia	\$626,203
Wyoming	\$968,525

Source: U.S. Census Bureau 2013.

OIL AND GAS 9B COMPLIANCE COSTS FOR OPERATORS

Industry currently faces an additional cost to comply with NPS regulations in parks compared to operating on lands outside park units. These additional costs currently apply to future operations and the 215 currently regulated operations that are approved under 9B plans of operations.

Cost categories specific to conducting non-federal oil and gas operations under an approved plan include the following:

1. Plan of operations preparation (permitting),
2. Compliance with NPS operating standards that exceed other federal, state, and local requirements,

3. Compliance with NPS reclamation standards that exceed other federal, state, and local requirements, and
4. Maintenance of performance bonds or equivalent financial assurance.

These regulatory costs are above and beyond those expenditures necessary to comply with other applicable federal, state, and local laws and regulation.

Further explanation for each cost category is provided below. It must be noted that actual costs incurred by operators are not commonly available to the NPS. Further, the costs associated strictly with compliance with 9B regulations versus other federal, state, and local laws and regulations are often combined, making the specific costs associated with compliance with 9B regulations difficult to distinguish. The NPS makes these estimates based upon the costs of typical services an operator might need to procure in order to meet the administrative and operational requirements of the 9B regulations.

Permitting Costs— Permitting costs apply only to future operations and current operations that lose their grandfathered status and must obtain an NPS-approved plan of operations. The costs described here include only those permitting costs that occur strictly due to the need to comply with the 9B regulations. For example, under the Safe Drinking Water Act, operators of underground injection wells must obtain a permit under the Underground Injection Control permit program established by the USEPA. Although the 9B plan of operations would only be approved when injection wells have a valid Underground Injection Control permit, the cost of obtaining the Underground Injection Control permit is not considered a cost of compliance with the 9B regulations.

Permitting costs for the 9B regulations consist of compiling and presenting the operational information and obtaining the data and providing the results of reconnaissance surveys. Permitting costs for a plan of operations can vary considerably, depending on the complexity of the operation and whether the plan is prepared in-house or contracted to an environmental consulting firm. Permitting costs include collection of information via reconnaissance surveys, which can account for the majority of the permitting cost. Surveys often include several or all of the following: location surveys, biological surveys including threatened and endangered species, cultural resource surveys, soundscape surveys, soil and water quality measurements, and wetland and floodplain delineations. Depending on the availability of qualified persons to conduct the surveys in the area of operations and the availability of existing resource information, reconnaissance survey costs can range from several thousand dollars to tens of thousands of dollars. For example, a widespread 3-D seismic survey may involve all of the surveys listed above over large geographic areas possibly costing up to \$100,000. The area of operations for drilling operations is much smaller than a seismic survey and so reconnaissance surveys for drilling proposals will typically cost from \$10,000 to \$30,000 with the length of the access road being a primary factor.

There are also 9B permitting requirements for existing operations that lose their grandfathered status and must obtain a NPS-approved plan of operations. For example, grandfathered operations that move to plugging and reclamation invariably lose their exemption when they apply for a plugging permit. Given that grandfathered wells are already drilled and completed and the area of operations (access route, well site, production facilities, and routes for gathering lines) has already been established, the plan of operations preparation is simplified and often involves no reconnaissance surveys. For these plans of operations, the cost of documenting current site conditions and discussing future operating plans can range from \$500 up to \$5,000 per well site. The high-end permitting cost estimate includes conducting a Phase I environmental site assessment if site contamination issues are suspected. If the initial environmental site assessment determined a likelihood of contamination, the plan of operations would then include proposals for a detailed sampling and remediation program. Based on historic averages, approximately four wells per year lose their grandfathered status, typically associated with operations moving to plugging and reclamation, and incur permitting costs.

When compared to other federal, state, and local laws and regulations permitting processes, the time to obtain an approved plan of operations under the 9B regulations can extend an operator's overall permitting process by up to 6 months.

Costs to Comply with NPS Operating Standards—This applies to new well drilling conducted under an approved plan of operations and includes costs for those NPS operational requirements that exceed other federal, state, and local requirements. Under the current approval process for plans of operation, the NPS requires operators to meet the least damaging standard, which includes using the appropriate mitigation measures as recommended in the Operators Handbook for Nonfederal Oil and Gas Development in Units of the National Park System (NPS Operators Handbook) (NPS 2006b). These operating standards may result in additional operational costs for operators, which are further described by the type of operation. Requirements to meet NPS operating standards can vary significantly depending on the proposed operation and its associated topography, access needs, water and wetland features, location of minerals, and other considerations. As such, the costs can vary by park and by operation.

For seismic operations, some mitigation examples that an operator might employ to meet NPS standards include off-trail travel by foot along receiver lines to avoid impacts to soils and vegetation, use of third-party monitors, and use of less disruptive (but possibly less efficient) shothole drilling equipment. Such mitigation measures can add \$1,000 to \$2,000 per day to a survey operation. As an example, additional costs of \$1,500 per day for a 2-month long survey could add approximately \$100,000 to project costs and might amount to a 5 percent increase to the overall project cost.

For drilling operations, additional 9B-required mitigation strategies might include mud handling and container systems; multiple liner systems on the drilling pad; material requirements for road base; casing and cementing requirements; storm water management; testing and evaluation; noise and light abatement; among others. These added mitigation measures can vary substantially depending on the topography, proximity to water features, site selection relative to downhole target location, and access to the park.

The NPS has found through information sharing from operators that the percentage increase to comply with NPS operating standards is typically a small percentage of a project's total cost (e.g., less than 10 percent). Additionally, the higher the overall drilling costs, the lower the percentage of cost increase caused by NPS regulation of the operation. For example, drilling costs in Big Cypress National Preserve and Padre Island National Seashore are considerable. Big Cypress National Preserve is located in the everglades in southern Florida. Roads and pads need to be built to support this development in a remote and wet region. Since there is limited oil and gas activity in Florida, drill rigs often need to mobilize from Louisiana or the other locations within the gulf coast. A 12,000-foot exploration well with a 4-mile long access road may cost up to \$8 million. Environmental considerations are also great, and the NPS might require mitigation techniques such as synthetic liners beneath drilling pads, active water quality monitoring during drilling, extra culverts along the road to maintain sheet flow of surface water. So even though operational costs to meet NPS standards could be several hundred thousand dollars, they add a relatively small percentage to overall project cost in this example.

However, NPS operating costs for drilling requirements under the current 9B regulations can become a higher percentage of project costs in other parks, such as those at Gauley River National Recreation Area and Big South Fork Nation River and Recreation Area. For these parks, mitigation actions for compliance with 9B regulations might be less extensive and much less expensive; shallow wells in these areas can also be drilled and completed for just several hundred thousand dollars. If the base project cost is \$300,000, then additional costs due to 9B regulations can become a notable percentage of overall project cost. For example, if least damaging methods included a longer access road to avoid sensitive resources, a lined drilling location, and enhanced erosion control measures, overall project costs could be increased by 10 to 30 percent.

Since 2000, most wells drilled under an approved plan of operations (20 of 22) have been in areas where drilling costs are high (i.e., Big Cypress National Preserve and Padre Island National Seashore) where 9B operational requirements represent a small percentage of overall drilling project costs (NPS 2013).

Operating standards for compliance with 9B production requirements include site security and public safety; pressure and flow control equipment; produced water storage and disposal; maintenance of access roads and pads, including vegetation management; among others. These standards for production operations are estimated to increase initial site costs up to \$2,000, with an average cost of \$500 per year increased maintenance per operation (NPS 2013).

Cost to Comply with NPS Well Plugging and Reclamation Standards—Provisions in the current regulations and approval process ensure that wells sites are plugged and reclaimed properly. Meeting the NPS requirements of leaving the site in a clean and safe condition in preparation for surface reclamation often involves placing liners underneath plugging equipment, using steel tanks instead of earthen pits, removing ground structures (e.g., berms), equipment, and debris, restoring natural contour of the land, and reestablishing native vegetative communities. NPS also requires cementing and casing requirements for plugging, and testing of plugs to verify they have been set at the correct depth and provide the intended wellbore isolation from aquifers. Based on NPS analysis of costs in existing plans of operations and NPS experience with these activities, these additional plugging and reclamation costs are estimated to be \$30,000 per well, which includes additional plugging and testing costs of \$7,000 and \$23,000 for additional surface reclamation costs. The 9B reclamation costs can vary by park depending on the soils, vegetation, and topography. For example, reclamation costs for wells in Lake Meredith National Recreation Area in Texas are relatively much less than those in Florida.

Based on historic averages and trends, the NPS has found that plugging and reclamation of old wells has essentially offset drilling and production of new wells, which has amounted to 4 wells plugged and reclaimed per year (NPS 2013).

Cost to Maintain Financial Assurance—Costs in this category apply only to the 215 operations currently being conducted under an approved plan of operations and new drilling and production operations. Under the current regulations, currently regulated operators are required to maintain a performance bond with a surety company or some other acceptable form of financial assurance. Under existing 9B regulatory caps, the amount of financial assurance the NPS can require is capped at \$200,000 per operator per park unit.

The NPS conducted a review of performance bonds and other sureties required for regulated operations, and estimates that operators spend approximately \$80,000 per year to maintain the required financial assurance. Assuming new drilling and production proposals are offset by plugging and reclamation of old wells, this estimate can also serve a basis for future projections.

The annual cost for an operator to maintain a performance bond with a surety company varies substantially depending on an operator's credit standing, reserve base, and whether the bond is unsecured or collateralized. Based on discussions with Argo Surety, the assumption is that annual premiums would range from 1.5 to 3.5 percent of the bond amount¹. Throughout this analysis, we use 3% of the bond amount as the annual cost of maintaining the financial assurance. We are seeking comments on whether this approach is reasonable.

¹ Personal communication with management of Argo Surety (Member of Argo Group), March 9, 2015 indicates annual premiums for average plugging and abandonment bonds range from 1-1/2 to 3-1/2% of bond amount, and only rarely approach 5%.

FINANCIAL INFORMATION FOR SMALL BUSINESSES IN THE OIL AND GAS EXTRACTION SECTOR

The overwhelming majority of the regulated and exempt operators are categorized as small businesses (90 of 98 operators) with less than 500 employees. In fact, the NPS believes the majority of the 90 small businesses operating in parks would be represented by companies with less than 50 employees. The average annual receipts for small businesses in the oil and gas extractor sector with less than 50 employees is estimated to be about \$15.7 million. Based on data from the 2007 Economic Census of the United States, the average annual expenses and investments is approximately \$9.8 million for this group. Table 33 provides annual receipts (i.e., revenues) and average annual receipts and expenses for different sizes of small businesses engaged in the oil and gas extraction industry.

TABLE 33. ANNUAL RECEIPTS AND EXPENDITURES FOR SMALL BUSINESSES IN THE OIL AND GAS EXTRACTION INDUSTRY IN THE UNITED STATES

Number of Employees	Number of Establishments	Total Receipts (1,000)	Average Annual Receipts per Establishment	Average Annual Expenses and Investments per Establishment
0 – 4	3,349	\$9,023,025	\$2,694,000	\$1,395,000
5 – 9	981	\$9,126,171	\$9,303,000	\$5,507,000
10 – 19	746	\$16,550,891	\$22,186,000	\$14,371,000
20 – 49	656	\$55,095,746	\$83,987,000	\$53,590,000
0 – 49	5,732	\$89,795,833	\$15,666,000	\$9,761,000
50 – 99	278	\$35,688,074	\$128,374,000	\$84,554,554
100 – 249	163	\$37,419,904	\$229,570,000	\$182,949,552
249 – 499	45	\$29,750,485	\$661,122,000	\$505,237,533

Source: U.S. Economic Census 2007.

Chapter 4

Environmental Consequences



CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This “Environmental Consequences” chapter analyzes beneficial and adverse impacts that would result from implementing any of the alternatives considered in this environmental impact statement (EIS). It is organized by resource topic and provides a standardized comparison among alternatives based on topics discussed in “Chapter 1: Purpose of and Need for Action” and further described in “Chapter 3: Affected Environment.” In accordance with the Council on Environmental Quality (CEQ) regulations, direct, indirect, and cumulative impacts are described and the significance of the impacts is assessed in terms of context, intensity, and duration (40 CFR 1502.16). The analysis for each impact topic includes the methods used to assess the type of impact. A summary of the environmental consequences for each alternative is provided in table 7 in chapter 2.

For a complete discussion of guiding authorities, refer to the sections titled “Federal Laws, Policies, and Regulations Directly Related to Non-Federal Oil and Gas Development in Units of the National Park System” and “Other Applicable Federal Laws, Policies, and Regulations” in “Chapter 1: Purpose of and Need for Action.” Collectively, these guiding laws and corresponding regulations provide a framework and process for evaluating the impacts of the alternatives considered in this EIS.

The action alternatives would cause effects on both current operations, some of which are exempt under the existing regulations, as well as future operations. This document presents site-specific information and analysis for actions that specifically and only address currently exempt operations that are present at nine park units. Operations that are currently approved under an NPS plan of operations as well as future operations are analyzed on a programmatic basis. Both existing exempt and future oil and gas operations will receive additional analysis to ensure compliance with the National Environmental Policy Act (NEPA) as part of their permitting process. Also, current regulated operations have already undergone site-specific NEPA analysis.

GENERAL APPROACH FOR ASSESSING IMPACTS BY RESOURCE

This impact analysis evaluates the difference in impacts between how oil and gas operations are currently managed on NPS lands and how those operations would be managed under either of the two alternatives described in “Chapter 2: Alternatives.” For natural resource topics addressed in this EIS, the impact of the actual physical changes to natural resources indirectly resulting from each of the alternative regulatory rule scenarios is analyzed. Other nonresource topics deal more directly with the economic effects of the proposed rule change. This approach includes the following elements:

- Focusing the analysis on those rule changes that have measurable impacts on the resources or values being evaluated, and not analyzing administrative rule changes for topics with no impacts.
- Using general analysis methods that follow CEQ and U.S. Department of the Interior (DOI) NEPA regulations and NPS Director’s Order 12 policy and its implementing handbook.
- Following basic assumptions used in NEPA analysis relating to the area of analysis, timeframe, and types of impacts.

- Evaluating cumulative impacts for each impact topic that address impacts from each alternative in combination with other actions that can affect the same resource or value.
- Determining significance of the impacts resulting from each alternative and disclosing any significant impacts found.

These elements are described in more detail in the following sections.

FUNDAMENTAL FACTORS IN ANALYSES OF ACTION ALTERNATIVES

Three key facts are fundamental to the impact analysis of the “Alternative B: Proposed Rule (Preferred Alternative)” and “Alternative C: Modified Proposed Rule.”

First, future operations within the scope of the current 9B regulations are subject to the same comprehensive NEPA and permitting requirements and operating standards as they would be for the action alternatives. Thus no new incremental adverse impacts on natural and cultural resources can be expected for these future operations as a result of implementing any alternative. Future operations are analyzed programmatically under “Regulated Operations (Current and Future).”

Secondly, the action alternatives create no new operational requirements on current operations now under an approved plan of operations, apart from some increased financial considerations for operators. Thus, no new incremental adverse impacts on natural and cultural resources can be expected for the 215 currently permitted wells as a result of implementing any alternative.

Lastly, none of the alternatives result in new surface disturbance or substantially different activities associated with the 241 grandfathered wells or the 78 wells that do not require access across federal lands. Thus, no new incremental adverse impacts on natural and cultural resources can be expected as a result of implementing any alternative for the 319 existing wells currently exempt from NPS plans of operations. Currently exempt operations (both grandfathered wells and access exempt wells) will undergo future site-specific compliance, as applicable, prior to an operations permit being issued for their operation.

Overall beneficial impacts on natural and cultural resources are expected for the action alternatives in conjunction with some increased financial considerations for operators.

RULE CHANGES ADDRESSED IN THE ANALYSIS OF IMPACTS

Although many areas of the 9B regulations are proposed for change, as described in “Chapter 2: Alternatives,” not all changes are anticipated to have measurable effects on park resources and/or oil and gas operators. In accordance with NEPA guidance to focus analysis on the most important issues, the interdisciplinary team identified those rule changes with the potential for measurable impacts on park resources and/or oil and gas operations. Those regulatory provisions and rule changes are described below.

Note that each of these proposed changes to the regulations is discussed under each impact topic, but the details of each are not repeated throughout the analysis, to avoid duplicative text and make the document easier to read. The reader is asked to refer back to this section or to chapter 2 for details on the regulatory content of the existing and proposed regulations.

REGULATORY PROVISIONS ADDRESSED UNDER EACH TOPIC

- **Exempt Operations** (access-exempt operations are currently addressed under the heading “Purpose and Scope” at 36 CFR 9.30(a); grandfathered operations are currently addressed under the heading “Existing Operations” at 36 CFR 9.33).

Access-exempt operations are currently beyond the scope of the regulations, which states that the regulations control all activities within any unit of the national park system in the exercise of rights to oil and gas not owned by the United States where access is on, across, or through federally owned or controlled lands or waters. Use of federally owned or controlled lands or waters is necessary for the operation to fall within the scope of the regulations. These operations do, however, have the potential to adversely affect federally owned or administered lands or waters. For example, oil and gas operations located wholly on non-federally owned lands within a unit of the national park system may be sited directly adjacent to federally owned or administered lands or waters.

“Access-exempt” operations are those that do not require access on, across, or through federally owned or controlled lands or waters, and are therefore currently exempt from regulation under the current 9B regulations.

Grandfathered operations are those that are currently exempt from regulation because they were conducting operations at the time the regulations became effective and had already obtained a valid federal or state permit. Grandfathered operations are addressed under the current regulations, where they are called “existing operations” at 36 CFR 9.33. Grandfathered operations may continue without an approved NPS plan of operations, but may be suspended if they pose an “imminent threat of significant injury” to park resources. Examples of a threat of significant injury include hydrogen sulfide gas releases, vegetative clearing outside the authorized area, well blowouts, hazardous spills, fires, impacts on cultural resources, and the use of high pressure equipment without adequate safeguards. In comparison, operations subject to NPS plans of operations must conduct activities in accordance with the least damaging standard. Because of the substantially lower operating standard for grandfathered operations, many of these operations do not use best management practices that serve to protect parks resources and values, or visitor health and safety. Reliance on state regulatory programs, other federal laws and regulations, and willingness of operators to voluntarily use best management practices often falls short of NPS park protection standards. It should be noted that even though grandfathered operations are exempt from the plan of operations requirement under current 9B regulations, states require some level of permitting and notification to plug and abandon wells. Thus, it is the NPS’s experience that the grandfathered status is invariably lost when an operation moves to the plugging and reclamation phase due to the need for a new permit, and grandfathered wells are generally plugged and sites reclaimed to NPS standards under the current 9B regulations.

“Grandfathered” operations are those that are currently exempt from regulation because they were conducting operations at the time the regulations became effective and had already obtained a valid federal or state permit.

NEPA requires the analysis to address potential impacts from permitted and exempt operations, since both are part of the existing baseline. Each topic begins with a discussion of typical impacts on that resource or value from regulated and exempt operations. The discussion then addresses alternatives B and C with an emphasis on exempt operations and the change that would occur under alternatives B and C, where every operation located within the boundary of the park unit would be required to obtain an operations permit. As a result, 9B regulations would apply to both

access-exempt and previously exempt grandfathered operations. The least damaging methods standard and other operating standards (as discussed below) would apply to all operations. These would replace the current “imminent threat” standard that applies to existing grandfathered operations, and would become the new regulatory standards for access-exempt operations that previously were not subject to any operating standards.

- **Financial Assurance** (bonding) (currently addressed at 36 CFR 9.48)

The existing regulations place a bonding cap of up to \$200,000 per operator, per park unit. In many cases, the NPS can still adequately bond an operation, but in other cases, an operator’s default financial assurance amount could present a substantial financial burden on the NPS and the taxpayer. These bonding limits leave the taxpayer exposed in the event that a company defaults on reclamation and cleanup responsibilities. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire funding for site reclamation. As a result, reclamation of well sites could be delayed indefinitely. Under the proposed regulations in alternatives B or C, the existing financial assurance limit that NPS can set per operation would be removed and replaced with a requirement that the amount of financial assurance equals the estimated cost of reclamation. With this provision in place, the NPS could conduct reclamation in the short-term using the financial assurance in the event of an operator default.

- **Financial Liability of Operators/Transfer of Interest** (currently addressed at 36 CFR 9.34)

Under the existing 9B regulations, an owner remains liable on its financial assurance until it notifies the NPS that the rights have been transferred to another operator. A new owner cannot operate until it posts financial assurance and ratifies the existing plan of operations. Therefore, a gap exists under the existing regulation. A prior owner who provides notice to the superintendent may request release of liability for financial assurance before the new owner posts its own financial assurance. Under the proposed regulations in alternatives B or C, a previous owner would remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance. This regulatory revision would ensure that financial assurance is maintained by a responsible party at all times.

- **Enforcement and Penalties** (currently addressed at 36 CFR 9.33(c) and 9.51)

Under the existing regulations, regulated operations are subject to suspension and revocation of approved plans of operation, and there is no practical method for addressing minor acts of noncompliance that do not rise to the level of suspension or revocation. Examples of minor infractions that unnecessarily impact park resource and values include slow response to small spills and erosion from lack of maintenance on roads and well pads. Access-exempt operations are outside the scope of the 9B regulations, and, therefore, no penalty provisions apply to these operations. Grandfathered operations are subject to suspension only if there is an immediate threat of significant injury to park resources. Under the proposed regulation in alternative B, a new penalty provision would be established which would allow the NPS to issue an operator citations to address minor acts of noncompliance. Under alternative C, a new provision would hold mineral owners and operators jointly and severally liable for obligations to comply with permit conditions and the regulations; in other words, both operators and owners could be liable for noncompliance and cleanup of sites.

- **Compensation for Access across Federally Owned Land** (currently addressed at 36 CFR 9.50)

Under the existing regulations, the NPS can charge a registration fee for use of park roads, but compensation for other uses, e.g., new roads or use of federal land to lay gathering lines outside an operator’s mineral right, is not addressed. Under the proposed regulations in alternatives B and C, a fee for new privileged access across federal lands outside the boundary of an operator’s

mineral right would be authorized. If the operator agrees to reclamation in lieu of a fee, then an operator could reclaim an area of disturbed land somewhere within the park unit to offset the operator's disturbance on the new land to gain access to its mineral right.

- **Authority to Recover Costs of Permitting and Administration of the Regulations**

Under existing regulations, the NPS does not recover costs for processing proposed plans of operations, which are not considered as special use permits, or for monitoring approved operations. Under the proposed regulations in alternatives B and C, the plan of operations would be replaced with an operations permit that is a type of special use permit. If the NPS takes steps to collect these monies, the funds collected to process the permit would be used for the purpose of cost recovery. Such funds could support increased monitoring of oil and gas activities on NPS lands.

- **Directional Drilling** (addressed under scope of the regulations at 36 CFR 9.30 (a))

When operators choose to directionally drill from surface locations outside a park to bottomhole locations inside the park (figure 2, chapter 1), the NPS regulates only the downhole activities inside park boundaries. The regulations provide operators an opportunity for an exemption from the plan of operations requirement. The opportunity for an exemption from the plan of operations and bonding requirements creates an incentive for operators to locate their operations outside of park units. In alternative B, the proposed regulations would include a stand-alone provision that clarifies the scope of NPS jurisdiction as covering only those operations within the boundary of the park unit. This codifies existing policy and guidance and, although the new provision would clarify the scope of NPS jurisdiction, there would be no change from existing practice. Under the proposed regulations in alternative C, the new regulations would expand NPS jurisdiction to encompass surface and subsurface directional drilling operations outside the boundary of the park unit. Thus, directional drilling operations outside the park boundaries would become subject to the same requirements as operations located within park unit boundaries.

REGULATORY AREAS NOT ANALYZED IN DETAIL UNDER EACH TOPIC

Other regulatory provisions and proposed rule changes addressed in “Chapter 2: Alternatives” are relatively minor or administrative in nature and would have no appreciable impacts on any of the impact topics included in this EIS. These areas are discussed briefly below, but are not analyzed further in this chapter.

- **Simple Administrative Changes** (such as text clarifications, removal of outdated definitions, editorial reformatting, and reorganization of regulatory text)

The proposed rule would simplify the language of the regulatory text, make editorial corrections, and reorganize the sequence of some of the paragraphs. The proposed rule would delete text that summarizes application of other NPS and Bureau of Land Management (BLM) regulations to the exercise of other mining and mineral rights that are not governed by 9B regulations. The proposed rule would also delete text summarizing requirements of the Antiquities Act because restating these statutory requirements in the 9B regulations is redundant. The proposed rule would also delete advisory statements regarding the design of an operator's permit application because these are more appropriate for inclusion in guidance materials developed after the promulgation of these regulations. These changes would not result in measureable impacts on park resources and/or operators.

- **Operating Standards**

Revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely applied to operations to meet the technologically feasible methods least damaging to park resources and values approval standard (referred to as the “least damaging standard”). Because adherence to these operating standards is already standard practice, this regulatory revision would not result in changes or measurable impacts on park resources and/or operators. Although the change in operating standards is not addressed in detail, standards are discussed as appropriate in the discussion of impacts for both permitted and exempt operations.

- **General Terms and Conditions**

The regulatory revisions add a new “General Terms and Conditions” section to summarize in one place those requirements and conditions that are administrative in nature and that apply to every operation conducted within a unit of the national park system. This section incorporates existing regulatory provisions at 36 CFR 9.36(a)(15) and (18); 9.41(g); 9.46; 9.47(b); and 9.51(b) into one section and adds a new requirement allowing third-party monitors access to the operations site. This regulatory reorganization would not change how these provisions are enforced and would not result in measurable impacts on park resources and/or operators.

- **Permit Review Process and Permit Requirements**

Under the proposed rule, the NPS would establish a two-stage permit application review process and provide more realistic timeframes for the NPS to provide notice to an operator regarding a final decision on their application. Other administrative changes would include eliminating the dual approval standards in favor of one set of criteria that apply to all proposed operations, and clarifying the final decisions NPS can take on an operator’s permit application. These changes would not result in measureable impacts on park resources and/or operators.

Also, the proposed rule spells out many permit requirements that are not stated in the current regulations, but are routinely required of applicants as documented in guidance in the Operators Handbook for Nonfederal Oil and Gas Development in Units of the National Park System (NPS 2006b) (NPS Operators Handbook). The proposed rule reformats the presentation of the information requirements and codifies some information requirements that are found in guidance. Because these permit requirements are already applied in the current permit process, this regulatory revision would not result in changes or measurable impacts on park resources and/or operators. Although the change in permit requirements is not addressed in detail, specific permit requirements are discussed as appropriate in the discussion of impacts for both permitted and exempt operations.

- **Well Plugging Provisions for Beneficial Use Determination**

The current regulation requires operators to plug and cap all nonproductive wells and to fill dump holes, ditches, reserve pits, and other excavations. This provision contains no specific authority for the NPS to make a determination as to whether a well has continued beneficial use. The proposed rule would make clear that operators are responsible for well plugging, establishes an NPS well plugging approval procedure, and sets a well plugging requirement based the length of time a well is inactive, and allows an operator to seek an exemption from the NPS plugging determination if it can demonstrate future utility of the well, wellbore integrity, and proper maintenance of the well and wellsite. The effects (benefits) of this regulatory change are essentially captured in the analysis of the effects of the loss of exempt status under both action alternatives. The effects of this change are discussed under each impact topic. The specific well plugging provision that is changing in the proposed regulations would not result in measurable changes to the numbers of wells that are eventually plugged, and is not analyzed further because

the effects on resources and/or operators are included in the analysis presented for exempt operations.

- **Supplementation or Revision of a Permit and Use of Temporary Access Permits**

The NPS would replace existing approval criteria with new criteria that apply to either a temporary access permit or operations permit. The NPS would replace the terms “supplement” and “revise” with the term “modification” to characterize any change to an approved operations permit and clarify that it can require modification of the operator’s permit or that the operator can request that the NPS modify their permit. Further, the proposed rule would describe the procedures for both the operator and the NPS to request modification and contain a prohibition on an operator implementing the modification until and unless the NPS has provided written approval of the modification to the operator. These changes would not result in measureable impacts on park resources and/or operators.

- **Public Participation**

Under the proposed rule, the public notification required under NEPA for the preparation of an environmental assessment or EIS for a proposed oil and gas operation would also suffice as public notice for the oil and gas permit application. This would be an administrative improvement over current requirements, which direct a superintendent to publish a separate notice in the Federal Register upon receipt of an operations permit application and to publish notice in a local newspaper of the request to conduct an oil and gas operation, whether or not a complete plan of operations is ever submitted. This proposed revision to public notification would not result in measureable impacts on park resources and/or operators.

GENERAL ANALYSIS METHODS

The analysis of impacts follows CEQ and DOI NEPA regulations and Director’s Order 12 policy and its implementing handbook (NPS 2011, 2001). The analysis incorporates the best available scientific literature applicable to the region and setting, species and areas being evaluated, and actions being evaluated in the alternatives.

Primary steps for assessing impacts include identifying potential impacts on park resources and values from oil and gas exploration, drilling and production, and reclamation under the no-action alternative, and the impacts from currently exempt operations, and then assessing the change (if any) to those impacts under the action alternatives. The degree of potential impacts on resources from oil and gas development depends on the type and location of operations and mitigation measures used to reduce impacts. As a result, a qualitative analysis of the potential impacts of oil and gas operations on the resources was conducted based on actual experience of the NPS in management of non-federal oil and gas operations, best professional judgment, and information available in the literature to assess their effects on park resources and visitor values. This analysis also addresses regulated operations, although the change in regulation would not cause changes at oil and gas operation sites.

Where possible, site-specific analysis that pertains to existing exempt operations is provided. Information obtained from NPS natural resource inventory and monitoring network data, park geographic information system (GIS) data, oil and gas management plans, and park site inspection records was used to characterize impacts of exempt operations and predict the impacts of bringing those operations under regulations as proposed in the action alternatives.

Impacts on resources and values from oil and gas development can occur during geophysical exploration, drilling and production, or reclamation phases of development. Current operations consist of both regulated oil and gas production sites with approved plans of operations (permits), and exempt operations

(which include both access-exempt and grandfathered operations). There are currently 534 oil and gas production operations in the 12 category 1 park units. Of these, 319 are exempt (78 access-exempt and 241 grandfathered). Actions at these parks also include ongoing or planned geophysical surveys and well plugging/reclamation.

Typical impacts on resources and values that could occur from both regulated and exempt operations during the various phases of oil and gas development (geophysical exploration, drilling and production, and plugging/reclamation) are described in the analysis. This is followed by a discussion of impacts from regulated operations (current and future) at NPS parks and a detailed assessment of impacts from exempt operations, which are the focus of the 9B regulatory changes. The analysis for the exempt operations includes site-specific information that can be used as a baseline for comparison of impacts under the action alternatives and for future compliance.

Most new operations (with the exception of access-exempt operations) would be subject to 9B regulations and are addressed along with the currently regulated operations, except for the socioeconomics analysis, which is a separate discussion.

BASIC ASSUMPTIONS USED IN THIS ANALYSIS

The following guiding assumptions were made to provide context for this analysis.

Analysis Period—This EIS assumes that the proposed regulations would be in effect for at least the next 20 to 30 years.

Analysis Area—The geographic study area for all topics addressed in this EIS comprises the park units that currently have oil and gas operations (category 1 park units) and those units that are considered more likely to be affected by future oil and gas operations, based on their proximity to existing oil and gas development outside the park units (category 2 park units), and their immediately adjacent neighboring properties except for the socioeconomics topic, which covers a broader area of analysis to address impacts on the local and regional economies. Table 1 in chapter 1 lists the category 1 and 2 park units. For those units that contain wells currently exempt from operations, the analysis area for site-specific discussions includes the well locations and immediate vicinity that could be affected by the actions taken. The distance may vary depending on the impact topic, as noted at the beginning of each topic.

Duration and Type of Impacts—For the purpose of the analysis provided in this EIS, the following assumptions are used for all impact topics.

Duration describes the length of time an effect will occur, either short term or long term.

Short-term: Impacts are those that occur up to one year.

Long-term: Impacts are those occurring over several seasons through the next 20 to 30 years.

Type describes the classification of the impact as beneficial or adverse, direct or indirect.

Beneficial: A positive change in the condition of the resource or a change that moves the resource toward a desired condition.

Adverse: A change in the condition of the resource that detracts from its condition or that moves the resource away from a desired condition.

Direct: An effect that is caused by an action and occurs in the same time and place.

Indirect: An effect that is caused by an action but occurs later in time or is farther removed in distance, but is still reasonably foreseeable.

Context describes the action relative to the area or location in which the impact will occur. The effects may be site-specific, local, regional, or even broader in scale. Director's Order 12 directs that impacts should be analyzed in several contexts when the impact varies geographically, over time, or in some other way (NPS 2011, section 4.5).

SIGNIFICANCE OF THE IMPACTS

According to the NEPA regulations adopted by the President's CEQ (40 CFR 1500–1508), the term “significantly” is based on the twin criteria of context and intensity (40 CFR 1508.27).

Context—This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

Intensity—This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity.

- Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect will be beneficial.
- The degree to which the proposed action affects public health or safety.
- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
- The degree to which the effects on the quality of the human environment are likely to be highly controversial.
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
- The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

- Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
- The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places (National Register) or may cause loss or destruction of significant scientific, cultural, or historical resources.
- The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act (ESA) of 1973.
- Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

For each resource topic analyzed, significance is addressed in the conclusion section at the end of the impact analysis.

CUMULATIVE IMPACTS ANALYSIS METHOD

CEQ regulations for implementing NEPA require the assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions” (40 CFR 1508.7). Cumulative impacts are considered for all alternatives, including the no-action alternative.

Cumulative impacts were determined by considering the combined effects of the impacts of the alternative being considered with the impacts of other past, present, and reasonably foreseeable future actions and assessing the contribution that the alternative makes to the overall cumulative impact on a resource or value. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects and plans that would affect the units in question and, if applicable, the surrounding region. Past actions are those that have occurred since the oil and gas regulations went into effect in 1979, and reasonably foreseeable future projects are those that would occur within the life of the plan. In accordance with CEQ guidance, past actions were included “to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for the actions and its alternatives may have a continuing, additive, and significant relationship to those effects” (CEQ 2005). Cumulative actions that could affect the various impact topics addressed in this chapter are presented below, both at a programmatic level and a more site-specific level for those category 1 park units with exempt operations.

The planning team identified programmatic level actions for all parks and adjacent lands in the overall area of analysis from general literature and knowledge of the parks and the regions in which they are located. These include the following:

Past, Present, and Reasonably Foreseeable Activity in Area of Analysis	Descriptions of Cumulative Actions
Prescribed fires and fire management actions	Controlled burns and mechanical fuel reduction to reduce fuel loads; plus other fire management actions such as fire line construction for suppression
NPS facility and road construction	Construction of buildings, visitor use and administrative facilities, and road construction and repair
Vegetation management	Treatment of areas with herbicides or mechanical methods to reduce exotic plants; other vegetation management includes removal and control of vegetation for utility lines
Trails development and maintenance	Clearing, grading, and surfacing of trails
Off-road vehicle (ORV) use	Use of ORVs (all-terrain vehicles, 4-wheel drives) off road in and in areas around the parks
Abandoned mine lands reclamation	Reclamation of abandoned mine land sites, including contouring, revegetation, cleanup of contaminated materials; installation of safety features and wildlife protection at shafts
Mining and logging activities	Vegetation removal; creation of deep openings or stripped lands; spoil piles, acid mine drainage at certain locations; clearing and harvesting of trees in forests around parks; change in natural vegetation; road construction; some replanting and surface reclamation
Recreational use	Wide range of recreational activities including camping, hiking, hunting, boating, etc., that are sources of trampling, noise, wildlife effects
Ranching, agricultural land uses	Grazing and planting of crops – change in natural vegetation and land use
Land development: residential and nonresidential (commercial, industrial) land uses, including road construction	Clearing for development and permanent footprint of development; sources of noise, lighting, pollution during construction and use; industrial uses can include air or water emissions
Future oil and gas development on adjacent lands	Oil and gas wells and associated roads and pipelines, transportation and collection /storage facilities on adjacent lands (see trends information, in text below)
Oil and gas well plugging and reclamation activities inside and outside of parks	Site reclamation, including restoration of natural contours, topsoil and vegetation cover, and removal of sources of contamination and contaminated soils
Recovery actions against operators that damage park resources under 54 USC 100721 (provides for NPS recovery of response costs and damages from any person who destroys, causes the loss of, or injures park system resources)	Cleanup of areas and recovery of natural resources that have been damaged from oil and gas spills that affected park lands and resources

The cumulative actions above would be expected in or near the category 1 and 2 park units included in this EIS and are addressed generally in a programmatic manner. Parks with exempt operations also have additional park-specific cumulative actions that were identified from park planning documents and are considered in the site-specific analysis for these units. Table 34 includes a more site-specific accounting of cumulative actions that could affect resources and values in those parks.

TABLE 34. CUMULATIVE ACTIONS SPECIFIC TO CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

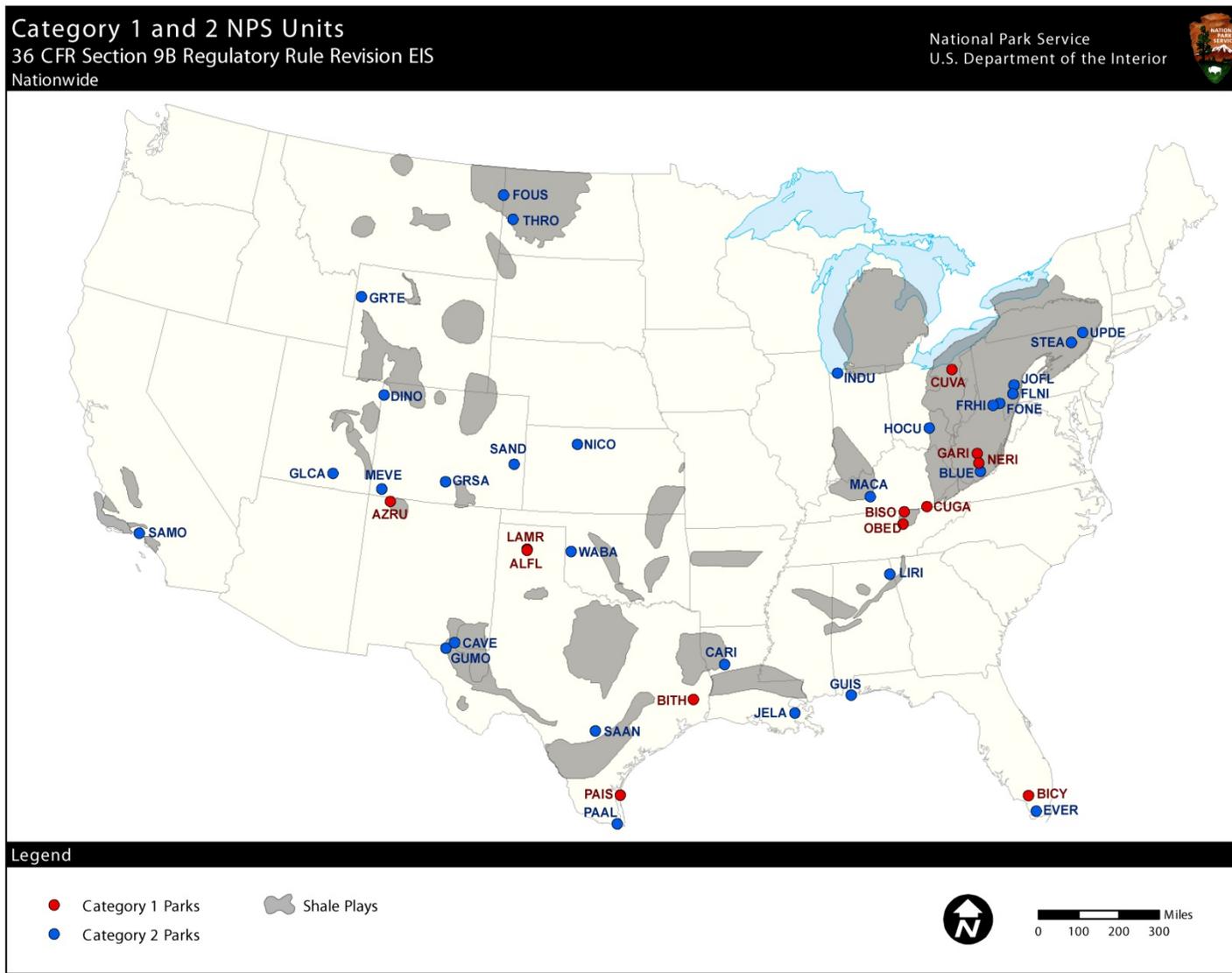
Park Unit	Cumulative Actions
Aztec Ruins National Monument	Actions include grazing; agricultural activities; residential development; road building; irrigation; and visitor activities within the park.
Big South Fork National River and Recreation Area	Actions include agricultural and forestry operations; commercial and residential development; road construction; existing and future coal mining operations; visitor use; prescribed fires; and plugging and reclamation of abandoned wells, including 39 under an American Recovery and Reinvestment Act (ARRA) funded program.
Big Thicket National Preserve	Actions include agricultural and forestry operations; urban and residential development; publicly owned facilities (water impoundments, water diversion structures, and sewage treatment); road construction; visitor use; and plugging of abandoned wells under an ARRA funded program.
Cumberland Gap National Historic Park	Actions include park developments and visitor use; establishment of nearby state parks; continued management of recommended wilderness in accordance with Wilderness Act and NPS policies; and acquisition of Fern Lake and the surrounding area.
Cuyahoga Valley National Park	Actions include residential, commercial, and transportation related land development and construction outside the park; ongoing park operations and maintenance; invasive and nonnative species management inside and outside of the park; land acquisitions and easements; agricultural use; and deer management in and around the park.
Gauley River National Recreation Area	Actions include urban development; transportation infrastructure improvements; and mined land reclamation.
Lake Meredith National Recreation Area	Actions include recreational activities; ranching and agriculture; residential development; road construction; water impoundments (i.e., Lake Meredith); recreational ORV use; and other visitor use.
New River Gorge National River	Actions include urban development; transportation infrastructure improvements; and mined land reclamation.
Obed Wild and Scenic River	In 2002, there was an oil spill and subsequent fire during the exploratory drilling for a well located adjacent to the boundary of the Obed Wild and Scenic River (the Howard / White Unit No. 1 Oil Well). The Natural Resources Damage Assessment — Pre-assessment Phase Report was prepared after collecting data necessary for determining the fate and effects of the spilled oil, reviewing the results and analyzing the data, compiling the administrative record, and determining that there was injury or potential injury to resources or services potentially affected. The DOI is proceeding with injury quantification and restoration planning to develop alternatives that would restore, replace, or acquire the equivalent of natural resources injured and/or natural resources lost as a result of this incident.

Trends in oil and gas development can also affect cumulative impacts. Energy development on lands adjacent to NPS lands is expected to continue into the foreseeable future. The exploration and production of shale gas, in particular, is anticipated to increase dramatically over the next 30 years. The U.S. Energy Information Administration's *Annual Energy Outlook 2013 Early Release* projects U.S. natural gas production to increase from 23.0 trillion cubic feet in 2011 to 33.1 trillion cubic feet in 2040, a 44 percent increase. Almost all of this increase in domestic natural gas production is due to projected growth in shale gas production, which is expected to grow from 7.8 trillion cubic feet in 2011 to 16.7 trillion cubic feet in

2040 (EIA 2013). Currently active and prospective shale plays that underlie or are located in close proximity to category 1 park units include the Utica (which underlies Cuyahoga Valley National Park); Marcellus (which underlies Gauley River National Recreation Area and New River Gorge National River); Chattanooga (which underlies Big South Fork National River and Recreation Area and Obed Wild and Scenic River); and Tuscaloosa (which lies near Big Thicket National Preserve). Category 2 park units with shale gas underlying or located nearby include the following 15 park units:

- Bluestone National Scenic River
- Carlsbad Caverns National Park
- Flight 93 National Memorial
- Fort Necessity National Battlefield
- Fort Union Trading Post National Historic Site
- Friendship Hill National Historic Site
- Guadeloupe Mountains National Park
- Hopewell Culture National Historic Park
- Johnstown Flood National Memorial
- Mammoth Cave National Park
- San Antonio Missions National Historic Park
- Santa Monica Mountains National Recreation Area
- Steamtown National Historic Site
- Theodore Roosevelt National Park
- Upper Delaware Scenic and Recreational River

Figure 7 illustrates the geographic distribution of these shale plays in the United States. Because there are shale gas resources on adjacent lands, this increase in exploration and production activities represents a cumulative action and impact.



Note: Refer to “Abbreviations of National Park Names” that starts on page xxx of this document for a complete list of park names identified in this figure.

FIGURE 7. GEOGRAPHIC DISTRIBUTION OF SHALE PLAYS IN THE UNITED STATES

GEOLOGY AND SOILS

METHODOLOGY

Potential impacts on geology and soils are assessed based on the actions being proposed and characteristics of the geology and soils in the park units, and disturbance to unique geologic features that may be affected. Paleontological features are also included in this section by their association to sensitive geologic formations. Resource-specific context for assessing impacts of the alternatives to geology and soils resources includes the following:

- the susceptibility of certain soil types to disturbance (particularly high erosion or shrink/swell potential, compaction characteristics)
- the uniqueness of the geologic features found in the parks
- the susceptibility of certain geology and soils to vibration, contamination, or other effects of oil and gas activities

For site-specific analysis, locations of the well pads of exempt operations were mapped relative to soil types and geologic features (e.g., rock arches, rock shelters, cliff edges) if this information was available in the parks' GIS data to assess impacts of those operations.

IMPACTS OF ALTERNATIVE A: NO ACTION

Typical Impacts of Oil and Gas Operations on Geology and Soils

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on geology and soils can result from vegetation clearing, which increases the potential for soil erosion by exposing the soil surface to water and wind. Surface disturbance from survey crews traversing the area during geophysical exploration could also cause soil compaction, reducing the soil's water-holding and infiltration capacities. Compacted soils increase runoff of surface waters and accelerate soil erosion (Duiker 2004; Penn State 2009). Ground vibrations from seismic survey technologies used during exploration to obtain images of target formations could adversely impact sensitive geologic features (such as arches) by creating soil movement or settling or ground vibrations. The majority of impacts associated with these surveys would be limited in extent and severity, because of the temporary nature of the disturbance and localized area disturbed by shotholes, foot traffic, and all-terrain vehicles.

Impacts of Well Drilling and Production

The primary impact on soils from existing oil and gas wells is a direct loss of soil productivity in the footprint of the site and access roads. During site preparation, impacts on geology and soils occur as a result of removing acreage from natural conditions and transferring that area to an industrial use to accommodate the drilling rig and associated equipment. Site preparation may include extensive vegetation clearing, grading, cutting, filling, and leveling of the site using heavy construction equipment. Soil material suitable for plant growth is often removed and stockpiled for use in reclamation. Slopes are particularly susceptible to erosion caused from road and well pad construction.

During drilling and production, the construction, maintenance, and use of access roads, well pads, flowlines, and pipelines could increase soil erosion and affect soil productivity from vehicle compaction

and vegetation clearing (Duiker 2004; Penn State 2009). Surface disturbances during drilling and production activities could cause soil compaction, thereby reducing the soil's water-holding and infiltration capacities. This would in turn reduce the root penetration capabilities of vegetation and hinder plant growth and further soil formation (Crush and Thom 2011). These compacted soils would also increase runoff of surface waters and accelerate soil erosion (DeJong-Hughes et al. 2001).

In addition to construction-related impacts associated with development of access roads and well pads, there is a risk of impact on soils from releases of hazardous or contaminating substances during drilling or production operations, including well workovers and servicing. These releases could occur from leaking equipment. In most cases, however, primary and secondary containment on a well pad should prevent the release of drilling muds, diesel fuel, oil and gas, and other substances beyond the well pad. The risk of releases reaching more area of the well pad or off-site locations is greater for those wells that are exempt because these wells are not required to have some of the more protective measures that are required under the 9B regulations. The unintentional or accidental release of hazardous or contaminated materials also includes the risk of release of drilling mud. Although drilling mud may pose a risk for impacts on geology and soils if there are spills, its presence alone does not represent an impact. Drilling mud—which may contain water and chemical additives such as alkalis, bactericides, soluble chromates—and corrosion inhibitors used to optimize well drilling (PSAC 2013), and cuttings from the well account for the largest volume of waste generated at the well site. Contamination from the release of produced waters containing salts and other well drilling fluids could also impact soils and other geology and soils in the park units. For example, such instances of leaks from salt-water disposal wells and subsequent contamination resulting from mechanical problems and improper operating practices have been documented at Big Thicket National Preserve (O'Dell 2013c).

The types of impacts related to soil erosion and runoff for directionally drilled wells are expected to be similar to those described for operations inside the park units; however, direct impacts to geology and soils in park units would not occur. The risk of indirect impacts and their intensity would vary with the location of the well with respect to the park boundary and direction of surface runoff. The risk of impacts on park resources would be greater for directionally drilled operations sited closer to park boundaries with surface gradients toward the park, where water and sediment can be transported downslope into park units through adjacent streams, gullies, or overland flow. Severity of impacts would depend on proximity of operations to the park units; site-specific environmental conditions, such as steepness and direction of slope and surface hydrology; sensitivity of resources; and mitigation measures being employed.

Impacts of Plugging and Reclamation

When drilling and production operations end, well plugging and surface reclamation result in overall beneficial impacts on geology and soils. Although plugging actions could result in surface disturbance from earth moving equipment, these disturbances are temporary and occur in previously disturbed areas. There are also beneficial effects on geology and soils once cleanup is successfully completed and the site is reclaimed to natural conditions and processes. Reclamation involves returning the topography of a site to approximate the original contours, replacing any stockpiled soils, and reestablishing natural vegetation. Revegetating disturbed areas provides erosion control in areas of previous impacts from oil and gas operations. Sources of potential leakage such as wellhead equipment and flowlines are also removed during plugging and reclamation. Beneficial impacts of plugging and reclamation are realized in both the short and long term.

Regulated Operations (Current and Future)

Activities inherent in oil and gas development would result in impacts on geology and soils. There would be impacts on geology and soils from ongoing or future permitted oil and gas production operations

include those described above under “Typical Impacts of Oil and Gas Operations on Geology and Soils.” The primary effects on soils from oil and gas operations stem from the fact that soils are taken out of beneficial use where they have been disturbed. Within the footprint of the disturbance, potential impacts include the loss of soils from grading or construction of facilities, soil erosion and sedimentation associated with disturbed areas; and possible soil contamination from leaks and spills, leading to adverse impacts on soil chemistry and productivity. There are currently 215 wells under plans of operation in the category 1 park units with an estimated 300 acres of direct disturbance associated with well sites and access roads. Table 35 provides information on the direct surface disturbance to federal surface estate associated with non-federal oil and gas operations. Direct surface disturbances from well pads range, on average, from 0.1 to 1 acre for non-directionally drilled operations, with the average area of road disturbance ranging from 0.4 to 1.2 acres per operation. The historic average of new drilling operations is about 4 proposals per year (NPS 2013). Some wells would be drilled from existing sites or on private property, and direct new surface disturbance on federal land is estimated to be around 5 acres per year.

Regulated operations are subject to the 9B regulations, which require that operating standards be met. Current operating standards specifically within the regulations include precautions for well control, proper handling of wastes, siting restrictions, and conduct of operations in a “safe and workmanlike manner (see current 9B regulations, 36 CFR 9.41 – 9.46). Additional resource-specific standards and recommended actions to achieve them are included in the NPS Operators Handbook (NPS 2006b). In addition, under the current approval process for plans of operation, the NPS works with operators to identify the relevant resource and visitor value issues and operating standards on a site-specific basis, which leads to the appropriate mitigation measures being incorporated into an approved plan of operations. Typical mitigation measures that minimize impacts on geology and soils include use of existing roads and pads, construction of single-lane roads with pullouts versus two-lane roads, efficiently sized well pads, avoidance of steep slopes and sensitive soils, removal of contaminated soils, effective erosion control, proper secondary containment around storage tanks, regular pump jack maintenance, and removal of debris, waste, and equipment no longer needed in operations. The implementation of these measures would reduce the extent or intensity of impacts on geology and soils.

Impacts on geology and soils from currently regulated and future operations also include the effects of geophysical (seismic) surveys that are conducted within the category 1 park units and may be conducted in category 2 park units. Since 1998, 20 seismic surveys have been conducted in 6 parks, averaging 1.4 surveys per year. All but one have been 3-dimensional seismic surveys covering large geographic areas. Going forward, the level of seismic activity is expected to taper off to about one proposed survey per year (NPS 2013). Impacts of these surveys include those described above under “Typical Impacts of Oil and Gas Operations on Geology and Soils.” The geographic extent of the surveys varies from operation to operation. However, under the current regulations, operations would need to meet the least damaging standard so ground disturbance would be kept to a minimum and sources of vibration would be required to be used at a safe distance from any sensitive geologic features.

When current operations end and wells are plugged and sites are reclaimed, impacts on geology and soils would be as described under “Typical Impacts of Oil and Gas Operations on Geology and Soils.” Provisions in the current regulations and approval process for well plugging ensure that sites are reclaimed properly and benefits are realized. Meeting the NPS requirement of leaving the site in a clean and safe condition in preparation for surface reclamation often involves placing liners underneath plugging equipment, using steel tanks instead of earthen pits, disposing of waste materials including any contaminated soil outside of the park, and employing erosion control measures on the access road and well site. NPS also requires testing of plugs to verify they have been set at the correct depth and provide the intended wellbore isolation.

TABLE 35. SURFACE DISTURBANCE ESTIMATES FOR NON-FEDERAL OIL AND GAS OPERATIONS IN CATEGORY 1 PARK UNITS

Park Unit	Currently Regulated and Exempt ¹ Operations	Average Well Pad Area (acres)	Average Length of Access Road (feet)	Average Width of Access Road (feet)	Average Area of Road Disturbance (acres)	Total Area of Disturbance (on Federal Lands)	
						Regulated	Exempt ²
Alibates Flint Quarries National Monument	0	NA	NA	NA	NA	-	-
Aztec Ruins National Monument ²	3	0.7	1,000	20	0.5	2.4	1
Big Cypress National Preserve ³	20	NA	NA	NA	NA	122	-
Big South Fork National River and Recreation Area ⁴	98	0.5	4,500	12	1.2	-	156.7
Big Thicket National Preserve ⁵	7	NA	NA	NA	NA	11	-
Cumberland Gap National Historic Park ²	2	NA	NA	NA	NA	-	7
Cuyahoga Valley National Park ⁴	69	0.5	1,320	15	0.5	3.6	79.5
Gauley River National Recreation Area ⁶	28	NA	NA	NA	NA	-	33
Lake Meredith National Recreation Area ⁵	174	0.5	NA	NA	0.6	139.7	43.1
New River Gorge National River	1	0.1	NA	NA	0.00	-	0.1
Obed Wild and Scenic River ⁵	4	1.0	1,320	14	0.4	-	5.7
Padre Island National Seashore ^{2,5}	14	NA	NA	NA	NA	27	-
	420					305.7	326.0

Notes:

1. Exempt operations considered in this table exclude those directionally drilled from locations outside of NPS boundaries as well as those operations that do not require federal access.
2. Source: aerial measurements

3. Source: plans of operations
4. Source: spatial analysis per Big South Fork OGMP
5. Source: oil and gas management plans
6. Source: 2003 oil and gas inventory

For production operations, the NPS has found that plugging and reclamation of old wells has essentially offset drilling and production of new wells. In the category 1 park units, 215 well sites that are under permit would eventually be reclaimed, representing approximately 305 acres of soils that would be restored. Current projections are that about 4 existing wells per year would be plugged and reclaimed (NPS 2013).

Oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from sensitive management areas (SMAs), including some that were designated to protect soils and geologic features. For example, a 500-foot setback for sensitive geomorphic features and a 100-foot setback from cliff edges would be established at Big South Fork National River and Recreation Area under the oil and gas management plan framework unless other mitigation that protects SMA resources and values is included and authorized in an approved plan of operations (NPS 2012b). Under the oil and gas management plan for Lake Meredith National Recreation Area, non-federal oil and gas operations, a “No Surface Use” stipulation, where new non-federal oil and gas operations would not be permitted, would apply in the “Geologic Hazards and Features SMA” within 250 feet of filled chimneys, or within 300 feet of where dolomite caprock is exposed at the surface. “No Surface Use” stipulations also apply in the “Paleontological Resources SMA” where there are scientifically significant paleontological resources (NPS 2002b). The permitting of future plans of operations within these park units would be subject to these SMA setback recommendations or other restrictions, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Currently Exempt Operations

Under the no-action alternative, existing and future “access-exempt” operations and existing grandfathered operations would also result in impacts on geology and soils. These impacts are often more extensive or more severe compared to impacts from regulated operations because exempt operations are not subject to NPS operating standards and the mitigation measures that would serve to remove or reduce impacts on geology and soils.

The following discussion provides more site-specific detail of the current and potential impacts on geology and soils from activities associated with these currently exempt operations. Currently there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. As shown in table 35, the 241 exempt operations on federal surface estate represent approximately 326 acres of disturbance associated with roads and pads. Flowlines associated with these operations have created additional surface disturbance when not placed along roads. However, the vast majority of flowline routes have naturally revegetated and would be abandoned in place. With no need for further management action, the acres of disturbance associated with flowlines have not been estimated and are not included in the 326 acres of disturbance calculation. There would be impacts on geology and soils from ongoing exempt operations including those described above under “Typical Impacts of Oil and Gas Operations on Geology and Soils.” However, because these operations are subject to a much lower operating standard of “imminent threat of significant injury to federal property,” there is a higher level of risk of impacts from continuous but minor leaks, lack of erosion control measures, use of earthen pits, or location of the operation close to sensitive resources. Similar to regulated operations, the primary effects on soils from exempt oil and gas operations stem from the fact that soils are taken out of beneficial use where they have been removed or disturbed in the well pad and along the access road. For grandfathered operations, soils would be disturbed or removed on approximately 326 acres, resulting in long-term impacts that would last until reclamation is complete. Acres of soils on access roads that would continue to be adversely affected would vary, depending on the need for access and length of the roads.

For access-exempt operations, the amount of disturbance to geology and soils features would be of minimal consequence to the federal interest related to geology and soils. Note that there will be no future grandfathered operations (their number is set and finite), but there could be future access-exempt operations. However, it has been relatively rare that a new operation, such as new well drilling, can take place in a park without using some degree of access on, across, or through federally owned or controlled lands or waters. New drilling on private lands inside park boundaries has been limited to a few wells on private property in Big South Fork National River and Recreation Area and one well at Cuyahoga Valley National Park. However, shale development could expand the number of parks affected by non-federal oil and gas development and could include parks where there is very little federal surface ownership. For example, there could be a large number of new wells developing the Marcellus shale within the Upper Delaware Scenic and Recreation River, which serves as a boundary between Pennsylvania and New York states. The upper 30 miles of the 73-mile long park unit lies within some of the most prospective sections of the Marcellus shale in terms of the thickness of organic-rich shale. There is private land ownership in this section of the park unit, so the 9B regulations would not be triggered by federal access under alternative A. The number of wells that could be drilled to develop approximately 30,000 acres inside the unit could range from 50 (640-acre spacing) to several hundred assuming smaller spacing units. Whether surface locations are outside or inside the park unit, direct impacts on geology and soils would be on private surface estate.

Exempt operations have the potential for continuing adverse impacts from improper waste disposal, lack of secondary containment or liners, and lack of a spill prevention plan. NPS well inventories have documented many instances of localized soil contamination and erosion on grandfathered sites that do not rise to the level of warranting suspension (see appendix D). Poor operating practices at these sites sometimes leads to spills, leaks and other releases of oils, produced water, or other chemicals that can contaminate soils. In addition, response to and cleanup of contaminated soils have been slow or substandard because of lack of regulation and associated oversight. Also, the use of pits instead of containerized mud systems has resulted in contamination of soils from drilling muds. Adverse impacts on soils resulting from instances of site contamination at exempt wells include decreases in soil productivity, both on private property and on nearby park property if contamination spreads off site. Erosion of soils at these sites may result because erosion control measures may not be adequate on the site or access roads, but such erosion does not rise to the level of an imminent threat of significant injury. Under the no-action alternative, issues of contamination at sites of exempt operations are expected to continue or to be cleaned up at the discretion of the operator, resulting in a continued potential for long-term adverse impacts on soils if the contamination is not remediated in a timely manner. For access-exempt operations, there could be indirect impacts on geology and soils, because the operations would take place on non-federal lands.

Site-specific data reveal several instances of currently grandfathered operations that have been documented as having some form of contamination on site, and the NPS has identified operating conditions at access-exempt sites that could potentially impact the geology and soils on federally owned lands. Appendix D presents information regarding the instances of known site contamination for each park unit with exempt operations.

Exempt operations also create impacts due to soil erosion. Necessary erosion control measures may not be present or used by operators that are not subject to 9B regulatory standards (access-exempt operations) or are subject only to a standard of not being an imminent threat (grandfathered operations). The table in appendix C summarizes the soil types and erosion potential at exempt well sites in the category 1 park units. The K factor noted in table 36 is a measure of the susceptibility of soil to erosion. Soils high in clay have low K values, about 0.05 to 0.15, and coarse textured soils, such as sandy soils, have low K values, about 0.05 to 0.2 because of low runoff. Medium textured soils, such as the silt loam soils, have a moderate K values, about 0.25 to 0.4, because they are moderately cohesive and they produce moderate runoff. Soils with high silt content are the most erodible of all soils. They are noncohesive and susceptible

to compaction. They produce high rates of runoff. Values of K for these soils tend to be greater than 0.4 (IWR 2009).

TABLE 36. SOIL TYPE AND SUSCEPTIBILITY TO DISTURBANCE FOR SITES WITH EXEMPT OPERATIONS

Park Units	Soils Types at Exempt Operations	Erosion Potential (K Factor)	Number of Operations
Aztec Ruins National Monument	Haplargids-Blackston	Low (0.15)	1
Big South Fork National River and Recreation Area	Gilpin	Moderate (0.28)	57
	Lily	Moderate (0.28)	73
	Lonewood	Moderate (0.28)	6
	Pope-Skidmore	Moderate (0.37)	1
	Ramsey	Moderate (0.28)	4
	Shelocta	Moderate (0.28)	2
	Wernock	Moderate (0.28)	9
Big Thicket National Preserve	Belrose-Caneyhead	High (0.49)	2
Cumberland Gap National Historical Park	Muskingum	Moderate (0.24)	2
Cuyahoga Valley National Park	Bogart loam	Moderate (0.32)	2
	Caneadea	Moderate (0.32)	1
	Chagrin	Moderate (0.32)	7
	Chili	Moderate (0.32)	6
	Conotton	Moderate (0.32)	1
	Ellsworth	High (0.43)	34
	Euclid	Moderate (0.37)	1
	Fitchville	Moderate (0.37)	3
	Geeburg	Moderate (0.43)	10
	Glenford	Moderate (0.37)	4
	Mahoning	High (0.43)	5
	Oshtemo	Moderate (0.37)	1
	Rittman	High (0.43)	3
	Tioga	Moderate (0.37)	1
Gauley River National Recreation Area	Berks	NA*	7
	Clifftop	Moderate (0.24)	10
	Dekalb	NA*	3
	Laidig	NA*	5
	Layland	NA*	1
	Nallen	Moderate (0.24)	2

Park Units	Soils Types at Exempt Operations	Erosion Potential (K Factor)	Number of Operations
Lake Meredith National Recreation Area / Alibates Flint Quarries National Monument	Burson	Moderate (0.37)	17
	Dallam	Moderate (0.24)	7
	Enterprise	Moderate (0.37)	3
	Likes	Low (0.15)	1
	Lincoln	Low (0.17)	2
	Mobeetie	Moderate (0.24)	4
	Tascosa	Low (0.15)	3
	Yomont	High (0.49)	2
New River Gorge National River	Cookport-Nallen	Moderate (0.32)	1
Obed Wild and Scenic River	Gilpin-Petros	Moderate (0.32)	4
	Lily-Gilpin	Moderate (0.28)	1

Source: NRCS 2013.

* Soil erodibility potential was not evaluated for every soil type located within Gauley River National Recreation Area because data was not available. A total of 22 wells which are not listed in this table are located on surfaces which have been designated as “rough broken lands,” “urdorthents,” “rock outcroppings,” or “borrow pits.” The National Resource Conservation Service does not ascribe erosion potential for these types of surfaces.

The majority of the soils in the category 1 park units with exempt operations (98 percent) have a moderate to high erosion potential. Of all soil types present in the vicinity of exempt operations, Belrose-Caneyhead and Yomont soils (found within Big Thicket National Preserve and Lake Meredith National Recreation Area, respectively) have the largest K factor at 0.49. Ellsworth, Mahoning, and Rittman soils also exhibit high K factors (0.43). These soils are found at Cuyahoga Valley National Park. These K factors represent the soils in their natural condition and do not indicate how past management or use has affected the soil’s erodibility. In those areas where the subsoil is exposed, the organic matter has been removed, and/or the soil’s structure destroyed or soil compaction has reduced permeability; the K factor would be increased regardless of soil type (IWR 2009).

Table 37 presents site-specific information regarding proximity of exempt operations to sensitive geologic features as included in park GIS databases. There are currently 319 exempt operations in category 1 park units, 59 of which are within 500 feet of sensitive geologic features.

TABLE 37. EXEMPT-STATUS WELLS LOCATED WITHIN 500 FEET OF SENSITIVE GEOLOGIC FEATURES

Park Unit	Number of Exempt Operations	Number of Operations Located within 500 feet of Sensitive Geologic Features
Aztec Ruins National Monument	1	0
Big Thicket National Preserve	2	0
Big South Fork National River and Recreation Area	152	29
Cumberland Gap National Historical Park	2	0
Cuyahoga Valley National Park	87	0
Gauley River National Recreation Area	28	0
Lake Meredith National Recreation Area	41	30
New River Gorge National River	1	0
Obed Wild and Scenic River	5	0

Appendix D provides information on oil and gas sites with documented records of contamination for the park units with exempt operations. Relatively recent site inspection records were available for two park units where a majority of exempt operations are found, Big South Fork National River and Recreation Area and Cuyahoga Valley National Park. Review of 122 site inspection reports from exempt wells at Big South Fork revealed 8 well head leaks, 14 sites with spills, 1 tank battery leak, and 1 pump jack leak. Several of the reports included information on the size of the contaminated areas, which ranged from less than 10 square feet for 9 of the wells, to up to 2,000 square feet at one site and “the entire wellpad” for another. Review of 41 site inspection reports at Cuyahoga Valley revealed 16 sites with wellhead leaks and 5 sites with spills, 11 tank battery leaks and 1 pump jack leak. Information about the extent of the spills was not recorded. Table 38 summarizes soil erosion and site contamination risk for exempt operations at the nine parks with these wells, based on the type of operation, contamination present, and maintenance of the operations.

TABLE 38. SOIL EROSION AND SITE CONTAMINATION RISK FOR PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	No. Grandfathered / Access-exempt operations	Documented Occurrences of On-site Contamination	Risk of Potential Contamination	Range of Soil Erosion Potential
Aztec Ruins National Monument	1 / 0	No	Low	Low
Big South Fork National River and Recreation Area	98 / 54	Yes	Low to high and mostly localized	Moderate
Big Thicket National Preserve	0 / 2	Yes	High	High
Cumberland Gap National Historical Park	2 / 0	No	Low	Low-Moderate
Cuyahoga Valley National Park	66 / 21	Yes	Low to high and localized	Moderate-High
Gauley River National Recreation Area *	28 / 0	No	Low	Moderate
Lake Meredith National Recreation Area	41 / 0	Yes	Low (gas wells) to moderate (oil wells)	Low-High
New River Gorge National River	1 / 0	No	Low	Moderate
Obed Wild and Scenic River	1 / 4	Yes	Medium	Low-Moderate

* Soil erodibility potential was not evaluated for every soil type located within Gauley River National Recreation Area because data was not available for all areas of the unit.

Directional Drilling

Under the no-action alternative the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units avoids direct impacts to soils and other geologic resources within the park unit. However, wells directionally drilled and produced from outside park units to bottomholes beneath the park units would directly impact soils and other geology on adjacent lands as well as presenting a risk of indirect impacts within the park units. The NPS cannot impose preventative measures such as mitigation employed by such operations, although the NPS does retain the authority to exercise control under 54 USC 100721 if such operations present an imminent danger to park resources or values by their proximity to park boundaries. The risk and intensity of impacts on park resources would increase for operations sited closer to park boundaries where water and sediment

could be transported downslope into park units through streams, gullies, or overland flow. Intensity of impacts on park resources would depend on proximity of operations to the park units; site specific environmental conditions, such as steepness and direction of slope and surface hydrology; and mitigation measures being employed.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limits, it is likely that many sites would have insufficient bonding for reclamation. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, remediation of well sites could be delayed indefinitely. Until well plugging and surface reclamation is completed, there would be loss of use and potential adverse impacts on geology and soils. Because performance bond amounts rarely approach \$200,000 for seismic operations, impacts on geology and soils from these operations are not generally tied to inadequate bond amounts. However, delayed reclamation would result in immediate and unnecessary adverse impacts on geology and soils that could become long-term impacts.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations, impacts on geology and soils could result from leaks or spills with no financial assurance to cover the cost of cleanup if there is no performance bond in place. If the new owner defaults before posting financial assurance, the NPS would need to seek and acquire funding for cleanup or reclamation. Reclamation could be delayed indefinitely. Over the interim period, the NPS would suffer loss of use, and potential adverse impacts on geology and soils features would continue until they were properly mitigated. These impacts would include adverse impacts on soil productivity and soil chemistry and productivity from the potential release of hazardous or contaminating substances during drilling or production operations.

Enforcement and Penalties

Under the no-action alternative, the lack of penalties for minor acts of noncompliance would result in less incentive for operators to comply fully with NPS operating standards. This increases the risk of unnecessary impacts (e.g., compaction, erosion, contamination) to geology and soils from spills and increased erosion.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages and any associated loss of use of geology and soils that result from privileged use of federal surface estate.

Cost Recovery

Under the no-action alternative, lack of cost recovery could have an indirect adverse impact on natural resources, including geology and soils, because additional money collected to support the NPS permitting, monitoring, and compliance programs could be used to enhance resource protection.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect geology and soils of the parks. Management planning, such as fire management, vegetation management, ORV, and oil and gas management plans, can result in greater protection for these

resources. Conversely, actions that cause disturbance of these resources would include activities such as prescribed burns, ORV use, mining, agricultural and logging activities, as well as any general development activities that include excavation, grading, or construction. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on geology and soils in the area of analysis (including both park lands and adjacent lands) and a brief summary of the cumulative impacts of these actions on geology and soils are listed in table 39.

TABLE 39. CUMULATIVE IMPACTS ON GEOLOGY AND SOILS (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Geology and Soils
Prescribed fires and fire management actions	Short- and long-term adverse effects on soils from loss of productivity following removal of vegetation that may be preventing erosion and sedimentation; short and long-term impacts from fire line construction that requires digging and displacement of soils and loss of organic matter from burning of surface litter and topsoil. Long-term beneficial effects of reduced fire occurrences with managed burns that reduce the possibility of catastrophic and high intensity fire; improved productivity and erosion control from vegetative cover that is established after these treatments.
NPS facility and road construction	Short- and long-term adverse effects on soils from direct loss of soils when removed for development and compaction of soils during road grading and construction using heavy equipment.
Vegetation management	Long-term beneficial effects of erosion control from improved vegetative cover, which hold soils in place.
Trails development and maintenance	Short- and long-term adverse effects on soils from compaction during clearing, grading and surfacing of trails, and removal of vegetation in trail footprint, exposing soils to wind and water erosion.
ORV use	Short- and long-term adverse effects on soils from compaction, erosion and sedimentation following vehicle-related disturbances to the soil surface; possible damage to unique geological features from collision, ground vibration, or vandalism.
Abandoned mine lands reclamation	Short-term adverse effects on soils from compaction during reclamation-related disturbances. Long-term beneficial effects of improved surface (revegetation) and reduced erosion following reestablishment of vegetation cover and natural contours.
Mining and logging activities	Long-term adverse effects on soils from erosion stemming from past surface disturbances and vegetation removal and long-term effects of acid mine drainage on soils (change in chemistry, productivity).
Recreational use	Short- and long-term adverse effects on soils from visitor activities including trampling and associated compaction, possible vandalism to unique geological features.
Ranching, agricultural land uses	Short- and long-term adverse effects from operations that remove vegetation cover, compact soils, create ruts that increase potential for erosion.
Land development: residential and nonresidential (commercial, industrial) land uses, including road construction	Short- and long-term adverse effects on soils from direct loss of soils in development footprint and compaction, erosion and sedimentation following construction-related disturbances.
Future oil and gas development on adjacent lands	Direct effects on soils on adjacent property and indirect adverse impacts on park soils from "spill-over effects" of sedimentation and contamination from surface runoff; trends indicate that the exploration and production of shale gas, in particular, is anticipated to increase dramatically over the next 30 years.

Past, Present, and Reasonably Foreseeable Activity	Impacts on Geology and Soils
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term adverse effects on soils from reclamation related disturbances due to use of equipment on site and grading. Long-term beneficial effects of restoration of natural contours, topsoil and vegetation cover that protects soils from erosion; removal of sources of contamination and contaminated soils.
Recovery actions against operators that damage park resources under 54 USC 100721	Long-term beneficial effects of cleanup of areas and recovery of natural resources that have been damaged from oil and gas spills that affected park lands and resources.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 40 includes an accounting of cumulative impacts that could affect geology and soils in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 40. CUMULATIVE IMPACTS ON GEOLOGY AND SOILS – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Grazing; agricultural activities; residential development; road building; irrigation; visitor activities within the park.	Loss of soils in footprints of development, soil compaction and rutting; reduced soil permeability; increased erosion.
Big South Fork National River and Recreation Area	Actions include agricultural and forestry operations; commercial and residential development; road construction; existing and future coal mining operations; visitor use; prescribed fires; and plugging and reclamation of abandoned wells including 39 under an ARRA funded program.	Loss of soils in footprints of development, soil compaction and rutting; reduced soil permeability; increased erosion; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, which change soil chemistry, and mine tailings resulting in contaminated sediments and soils' beneficial impacts from abandoned well plugging.
Big Thicket National Preserve	Actions include agricultural and forestry operations; urban and residential development; publicly owned facilities (water impoundments, water diversion structures, and sewage treatment); road construction; visitor use; plugging of abandoned wells under an ARRA funded program.	Loss of soils in footprints of development, soil compaction and rutting; reduced soil permeability; increased erosion; agricultural runoff, such as fertilizers and oil, and leachate from septic systems resulting in changed soil chemistry; benefits from plugging of abandoned wells – site cleanup, grading and addition of soils, revegetation to hold soils in place.
Cumberland Gap National Historic Park	Park developments and visitor use; establishment of nearby State Parks; continued management of recommended wilderness in accordance with Wilderness Act and NPS policies; acquisition of Fern Lake and surrounding area.	Loss of soils in footprints of development; benefits include reduced rates of erosion and compaction through wilderness management and acquisition of additional soil and geology resources in the park.

Park Unit	Cumulative Actions	Description of Impacts
Cuyahoga Valley National Park	Residential, commercial, and transportation related land development and construction outside the park; ongoing park operations and maintenance. Invasive and nonnative species management inside and outside of the park; land acquisitions and easements; agricultural use	Loss of soils in footprints of development, soil compaction and rutting; reduced soil permeability; increased soil erosion; agricultural runoff, such as fertilizers and oil or herbicide use from vegetation management resulting in changed soil chemistry; benefits to soils and geology from acquisition of additional acreage in the park.
Gauley River National Recreation Area	Urban development. Transportation infrastructure improvements; mined land reclamation.	Loss of soils in footprints of development, compaction and rutting; reduced soil permeability; increased erosion. Beneficial cumulative impacts from mine reclamation include improvements to soil structure and reduced rates of erosion.
Lake Meredith National Recreation Area	Actions include recreational activities; ranching and agriculture; residential development; road construction; water impoundments (i.e., Lake Meredith); recreational ORV use and other visitor use.	Loss of soils in footprints of development, soil compaction and rutting; introduction of contaminants into soils and lake sediments from leaking fuels; reduced permeability of soils, and increased erosion and sediment accumulation in surface waters; and indirect effects to the extent of flooded or saturated soils from increases or decreases in water levels and/or alter the duration and frequency of stream flows.
New River Gorge National River	Urban development. Transportation infrastructure improvements; mined land reclamation	Loss of soils in footprints of development, compaction and rutting of soils; reduced soil permeability; increased erosion. Beneficial impacts from mine reclamation include improvements to soil structure and reduced rates of erosion.
Obed Wild and Scenic River	Catastrophic release.	Contamination of soils from spill – oil and fire byproducts; erosion of soils following fire.

Overall, both adverse and beneficial cumulative impacts would result from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated operations would have a beneficial impact on geology and soils in all category 1 and 2 park units, while exempt operations would cause adverse impacts stemming primarily from the current lack of regulation. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development in the broader study area and the other cumulative actions affecting the resource in the entire study area.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in measurable impacts. Impacts on geology and soils from regulated operations relating to site contamination, erosion and sedimentation, and adverse effects on unique geologic features would be as described for alternative A, no action.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations would typically not change the direct impacts within the footprint of the operation on geology and soils; in most cases, there would still be the same loss of soil productivity as in alternative A. In some cases, direct impacts to soils and geology may be reduced as a result of partial or interim reclamation performed in order to meet the NPS standard of using only the amount of surface necessary to conduct operations. Also, the change in regulation under alternative B would reduce indirect impacts and the risks of impacts on geology and soils from this class of oil and gas operations because of the implementation of better operating practices, resulting in long-term beneficial impacts on soils and geologic features. Impacts from site operation would include soil compaction and increased soil erosion from vehicle compaction and vegetation clearing, leading to adverse impacts on soil productivity; and impacts on soil chemistry and productivity from the potential release of hazardous or contaminating substances during drilling or production operations. However, once the rule change is implemented, these operations would need to meet the least damaging standard and other operating standards that are spelled out in the regulations. Examples of operating standards and mitigation that could now apply to previously exempt operations include removal of contaminated soils, effective erosion control, proper secondary containment around storage tanks, prohibition on earthen pits (must use containerized mud systems), leak detection and containment, required offsite disposal of past drilling wastes, multiple liners on the drilling pad, and other spill prevention measures. This would result in reduced erosion, remediation of contaminated soils, and a reduction of risk of future contamination, thereby reducing adverse impacts. The proposed rules also require that operators use native soil material and grade to conform the contours to elevations that maximize ecological value. For those operations on private lands (previously access-exempt) where there is a reasonable chance of accidents affecting geology and soils on federal lands, bringing these operations within the scope of the 9B regulations will allow park managers to take a proactive approach to protecting the federal interest by ensuring that operations inside the park unit are conducted in a manner that offers the highest possible protection to a park's resources and values. The risk of impacts from spills that could reach park property would be substantially reduced by implementation of strong spill prevention, control, and countermeasure technologies.

As previously discussed, oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, which include unique geological features at Big South Fork and Lake Meredith / Alibates Flint Quarries National Monument. Any future permits within these park units would be subject to these SMA setback recommendations, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Looking at site-specific information available for the nine parks with previously exempt operations, under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. As a result, there would be beneficial effects to geology and soils through requirements to adhere to these standards and measures. Information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting park resources, including geology and soils. Regulatory oversight under alternative B would also require that precautions be taken where possible to prevent impacts on sensitive geologic features such as natural

arches, cliff edges at Big South Fork National River and Recreation Area and caprocks at Alibates Flint Quarries National Monument, and paleontologic resources at sites through the NPS.

Bringing currently exempt oil and gas operations under the 9B regulations would result in a reduction in the severity of adverse impacts on geology and soils from oil and gas operations, particularly where soils with a high susceptibility to soil erosion coincide with currently exempt sites that have a high potential risk for contamination, such as those present at Big Thicket National Preserve (table 38). Of all soil types present in the vicinity of exempt operations, Belrose-Caneyhead and Yomont soils (found within Lake Meredith National Recreation Area and Big Thicket National Preserve) have the largest K factor at 0.49; these are the soils with the greatest potential to be eroded. The risk of impacts on these sites and other soils occurring on lands in the federal interest would be reduced through the application of improved standards for the use of least damaging technologies (erosion control) at sites where, presently, only the imminent threat standard or no standard applies. Also, operators would be responsible for the cleanup of released hydrocarbons, produced waters, or treatment chemicals on contaminated sites. Well sites with documented contamination are expected to be remediated more quickly as a result of new management provisions enforced under the 9B regulations. This more rapid response to the remediation of spills at sites identified as priorities for cleanup would reduce the extent of further damage to soils and lead to improved soil conditions under a more protective standard for operations and maintenance of sites with a documented history of contamination. Therefore, alternative B would result in long-term, direct beneficial impacts on geology and soils on previously exempt operations.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B, impacts on geology and soils would be the same as described under alternative A.

Financial Assurance

Impacts affecting soil productivity, such as spill- and leak-related changes to soil chemistry, soil compaction and increased erosion, would be remediated in a more timely manner with the enhanced financial assurance requirements under alternative B. Impacts on geology and soils from seismic operations are not generally tied to inadequate bond amounts, so this provision would not have much of an impact on this specific phase of oil and gas development. However, adequate bonding for drilling and production phases would provide funds for the NPS to reclaim sites sooner in the event of an operator default. This would result in a beneficial change to impacts on geology and soils compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, a previous owner would remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance. This regulatory revision would ensure that financial assurance is maintained by a responsible party at all times. This would reduce the risk that the NPS would suffer unnecessary loss of use and potential adverse impacts on geology and soils, because the continuance of financial liability would ensure that reclamation would occur compared to the existing condition.

Enforcement and Penalties

Under alternative B, the new penalty provision that would be established would provide incentives for an operator to comply with the 9B regulations. That would, in turn, facilitate protection of park resources

and values, including geology and soils, resulting in a long-term indirect beneficial impact compared to the existing condition.

Compensation for Access across Federally Owned Land

Under alternative B, beneficial impacts on geology and soils may result from compensatory reclamation activities that may be done in lieu of an access fee. These activities could include restoration of disturbed areas, including legacy oil and gas sites to natural conditions. Over the long-term, beneficial impacts on geology and soils would accrue from such reclamation measures completed under alternative B, compared to the existing condition.

Cost Recovery

Under alternative B, the increased monitoring and evaluation of operations that could be funded by permit application fees would allow for NPS to detect potential problems such as spills and releases, and ensure operational compliance, thereby mitigating potential impacts on many resources including geology and soils. Although permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to geology and soils to the extent these funds were applied to increased monitoring and evaluation of operations. As a result, under alternative B, cost recovery could have a beneficial impact on geology and soils, compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, there would be adverse and beneficial cumulative impacts from projects, plans and actions, and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on geology and soils, as described in the above analysis. Bringing previously exempt operations under regulation would add substantial beneficial impacts on geology and soils. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on geology and soils from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on geology and soils at the site-specific level of analysis.

Directional Drilling

The regulation of directionally drilled wells under alternative C would result in both direct and indirect beneficial effects to geology and soils beyond park boundaries either by application of NPS operating standards on operations located outside the unit, or by operators choosing a surface location inside the park boundary.

However, the application of regulations on surface and subsurface operations located outside of NPS boundaries may potentially remove a key incentive for operators to locate operations outside of park units. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed (O'Dell pers. comm. 2013d) (see the "Socioeconomics" section). As a result of the changes in alternative C, operators may be more likely to select locations within park unit boundaries, thereby intensifying direct impacts on park resources, including geology and soils. If surface locations are sited within the park unit boundaries, adverse effects on park geology and soils would include those impacts previously described under "Typical Impacts of Oil and Gas Operations on Geology and Soils" and include loss of use, soil compaction and increased erosion, changes to soil chemistry and productivity and impacts on sensitive geologic features related to exploration and production activities that would be associated with wells.

Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to geology and soils within park units compared to the existing condition. However, a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, would facilitate protection of park resources and values, including geology and soils, resulting in a long-term indirect beneficial impact on geology and soils.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, there would be effects on geology and soils as a result of oil and gas operations that would continue to affect geology and soils where impacts cannot be avoided, and benefits from bringing previously exempt operations under regulations and the resultant reduction in adverse impacts, as described in the alternative B analysis. Alternative C would contribute to cumulative impacts mostly by adding beneficial impacts of bringing previously exempt operations under regulation, but also by possibly adding adverse impacts from the change in directional drilling regulations that could result in more oil and gas development within park units as opposed to outside park boundaries. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on geology and soils from the existing condition. Continuing impacts on geology and soils from regulated and exempt operations would be expected. Impacts would be as described in the analysis, with a risk of more extensive adverse impacts on access-exempt or grandfathered sites unless those sites changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations would result in impacts such as erosion (including off-site effects), contamination, change in soil chemistry and productivity, and possible effects on unique geological features if not protected. As a result, there would be continuing impacts from ongoing oil and gas activities within the park units. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on geology and soils. Directionally drilled wells would continue to be a potential source of indirect adverse effects on park soils if they are sited close to the parks and contaminated soils or water leave the site. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including geology and soils, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts due to erosion or runoff. Because the adverse effects under alternative A would be generally localized, would not result in widespread degradation of park soils and geology, and would be mitigated by setbacks and site reclamation, these impacts would not be significant.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on geology and soils in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects as described above would accrue from the continued unregulated operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term direct and indirect beneficial impacts on geology and soils, compared to the existing condition. Benefits would accrue primarily from reduced risk to geology and soils due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the no-action alternative. This would result in improved erosion/sedimentation control, storm water management, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Overall these regulatory improvements would result in long-term direct and indirect beneficial impacts on geology and soils compared to the existing condition. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would be very limited in extent compared to the entire park area, and mitigation measures or stipulations would reduce the loss or degradation of soils and geologic features, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations. Adverse impacts of oil and gas development would be localized, subject to regulatory review, and limited, and would not be significant.

Alternative C

Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B. The same extension of regulatory authority and oversight to currently exempt operations would be as described for alternative B, but with the possibility of some wells (operations located wholly on non-federally owned lands but still within the boundary of a park unit) not being under the regulations if they meet certain criteria, as described above. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on geology and soils because the NPS standards would apply to locations inside and outside the park. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts such as erosion, contamination, change in soil chemistry and productivity, and possible effects on unique geological features within park boundaries, following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to geology and soils within park units compared to the existing condition, although these impacts would be localized and small in number. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on geology and soils, primarily from bringing previously exempt operations under regulation. Because alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would be limited in extent compared to the entire park area, and mitigation measures or stipulations would reduce the loss or degradation of soils and geologic features, the impacts of this alternative would not be significant.

Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans, and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial. Adverse impacts of oil and gas development would be localized, subject to regulatory review, and limited, and would not be significant.

AIR QUALITY

METHODOLOGY

The degree of potential impacts on air quality from oil and gas development depends on the type and location of operations and mitigation measures used to reduce impacts.

The exploration and production of oil and gas has the potential to impact air quality from a variety of sources, and these are considered in assessing impacts:

- suspended particulate matter (dust) generated from construction of access roads, well pads, production facilities, flowlines, gathering lines and pipelines, and site reclamation activities; combustion of diesel-powered equipment; the oil and gas itself; routine emission of noxious vapors from storage tanks; vehicle exhaust; and traffic on paved and unpaved roads;

- accidental spills of volatile petroleum products, resulting in emissions of hydrocarbons or volatile organic compounds, and other pollutants such as hydrogen sulfide (H₂S);
- emissions of carbon monoxide (CO), and oxides of nitrogen (NO_x) from vehicle and stationary gasoline and diesel engines (including electric generators from construction machinery and vehicles transporting equipment); and
- flaring of gas during well testing and production operations.

IMPACTS OF ALTERNATIVE A: NO ACTION

Typical Impacts of Oil and Gas Operations on Air Quality

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on air quality would result from increased vehicle use to transport seismic work crews and equipment to drill shotholes. Combustion engine emissions include volatile organic compounds (VOCs), NO_x, CO, and sulfur dioxide (SO₂). The primary pollutants of concern are NO_x which are formed in the high temperature, pressure, and excess-air environment of combustion in diesel engines. Lesser amounts of CO and hydrocarbons are also emitted. Some SO₂ is emitted due to the burning of gasoline and diesel (which can contain minor amounts of sulfur). The amount of engine emissions depends on the number and type of gasoline or diesel-fueled vehicles and shothole drilling equipment used and the length of use. The majority of impacts associated with 3-dimensional seismic surveys are limited in extent because of the temporary nature of the survey. For large-size particulates and CO emissions, impacts would be localized during this period and would not adversely impact the attainment status of an airshed. However, for other pollutants, like VOCs and NO_x (or even SO₂ which transforms to SO₄ fine particles downwind), these impacts may be localized, as well as contribute to regional air quality impacts due to the regional nature of air quality analyses, but would not be expected to trigger a prevention of significant deterioration (PSD) analysis or impact the class I status of an airshed. In general, emissions impacting air quality are not contained to one specific location, but disperse regionally, classified as an airshed.

Impacts of Well Drilling and Production

The primary impacts on air quality from well drilling and production include emissions from vehicles and heavy equipment during construction and maintenance as well as emissions released during drilling and production activities. Vehicles and heavy equipment used for the construction and maintenance of access roads, well pads, flowlines, and pipelines, and well drilling could introduce nitrogen oxides, volatile organic compounds, carbon monoxide, sulfur dioxide, and odors from operating large engines, pumps and auxiliary equipment. This can result in short-term (construction activities and drilling operations) to long-term (roads, production operations, and flowlines and pipelines) adverse impacts on air quality.

Hydrocarbons and volatile components of well treatment chemicals would continue to be released at existing drilling, production, or transport operations.

Drilling activities can involve continuous operation of combustion engines over a 15- to 120-day period depending on the depth and complexity of the well drilled. This activity would introduce emissions of nitrogen oxides (NO_x), carbon monoxide (CO), and sulfur dioxide (SO₂). Large diesel engines, which are used to power the drill, rigs, pumps, and auxiliary equipment emit nitrogen oxide compounds (NO_x) as primary pollutants of concern. Nitrogen oxides are formed in the high temperature, pressure, and excess-air environment of combustion diesel engines. Smaller amounts of carbon monoxide (CO) and hydrocarbons would also be emitted. Some sulfur dioxide (SO₂) would be emitted due to the burning of

gasoline and diesel (which contain minor amounts of sulfur). The amount of engine emissions depends on the drilling rig size (horsepower), percent sulfur in the fuel burned, gallons of diesel fuel burned per hour, the hours per day, number of days the diesel rigs operate, and the use of any emission control devices. For a comparison, a recent analysis of existing impacts on air quality from drilling operations at Big South Fork National River and Recreation Area determined the amount of NO_x and VOCs that would be produced per well for oil drilling. Using a typical horsepower of 350 hp and the assumption of seven days to drill a well, the Big South Fork analysis estimated that emissions from one drilling operation would be about 0.7 tons per year of NO_x. VOC emissions would be minimal (NPS 2012b).

Hazardous air pollutants that can be released during oil and gas operations are benzene, toluene, ethylbenzene, and xylene (known as the “BTEX” chemicals); hydrogen sulfide (H₂S); arsenic (As); and mercury (Hg). These pollutants demonstrate a high toxicity and can lead to increased rates of cancer and respiratory disease in humans either acutely or chronically exposed to high concentrations in the environment. Existing concentrations of and potential exposures to these pollutants vary widely depending upon the physical characteristics of the site, the proximity of human populations, the level of oil and gas production and the type of production equipment employed (NRDC 2007). Drilling activities can produce hydrogen sulfide when equipment encounters gas or fluids under pressure. Hydrogen sulfide presents a serious localized air quality concern because it is extremely toxic at very small concentrations. Hydrogen sulfide, if encountered, is extremely hazardous to normal oil field operations because of potential adverse health effects, and it contributes to metal fatigue in drilling equipment. However, if zones containing gas or fluids under pressure are encountered, the drilling mud system can be adjusted (mud weight is increased) to prevent the release of hydrogen sulfide. Drilling is discontinued until the pressure is stabilized and there is essentially no gas entering the hole. The small amount of gas that could reach the surface is vented from the system by use of a de-gasser unit and flared (burned). Drilling and producing of hydrocarbons containing toxic gases can be performed safely and without incident if the necessary precautions are taken and appropriate safety procedures are followed.

Odors from drilling and production operations could affect visitors and park employees. The possibility and extent for odor would depend on wind speed and direction and the nature of the drilling equipment and material encountered during drilling operations (particularly the presence of hydrogen sulfide-bearing zones). Odor would be more noticeable during light breezes and less evident during periods of stronger winds.

For both existing and future operations, hydrocarbons could volatilize and enter the atmosphere as the result of a leak or spill. In the vicinity of the leak or spill, concentrations of gas and other constituents could present health hazards to animal and plant life. In addition, a leak or spill could provide a source for explosion or fire. These adverse impacts could be serious on a very local level; however, with mitigation, and prompt response in the event of a spill, adverse impacts would be short-term. These impacts would be localized as well as contribute to regional air quality impacts from the introduction of hydrocarbons into the larger airshed.

Photochemical reactions between hydrocarbons and NO_x produce ozone. Although the concentration of all these pollutants would increase as the fields are developed, the levels are expected to be low and are required to comply with federal and state standards and conform to all local air quality state implementation plans. The extent of impacts caused by increases in pollutants may range from areas near each well to longer ranges, low-level contributions to regional impacts, like ozone and haze formation.

In some areas of the country, ambient levels of ozone cause visible injury to vegetation, including dark stippling and chlorosis (i.e., bleaching), and decreased plant growth and productivity. Elevated ozone levels have also been linked to significant changes in plant community composition due to the effect of

ozone on growth and reproduction, and to reduced ecosystem water quantity, due to the effect of ozone on water use efficiency in plants (USEPA 2013d).

Atmospheric nitrogen deposition acts as fertilizer, favoring some plants, including invasive species, and leaving others at a competitive disadvantage. This creates an imbalance in natural ecosystems, and over time may lead to shifts in the types of plant and animal species present, increases in insect and disease outbreaks, disruption of ecosystem processes (such as nutrient cycling), and changes in fire frequency. Arid grasslands and shrublands are particularly vulnerable to changes caused by nitrogen deposition. Nitrogen deposition may disrupt soil nutrient cycling and alter plant communities. Invasive grasses thrive in areas with high nitrogen deposition, displacing native vegetation adapted to low nitrogen conditions. The fire risk subsequently increases due to extensive areas of weedy grasses.

Greater use of motor vehicles during construction of access roads and pads, and during drilling, would increase particulate matter from vehicle exhaust and dust from paved and unpaved roads. Exhaust from machinery used during construction and drilling would also contribute to an increase in particulate matter. As a result of increased particulate matter emissions, visibility may be slightly impacted during construction and drilling in any localized area where these activities are undertaken. There could be some added impact on regional visibility due to transport of fine particulate matter and haze produced by secondary aerosols (i.e., particulate matter formed from gaseous emissions of SO₂, NO_x, and VOCs, in particular). Particulate matter emissions would be greatest during any necessary construction of roads, pads, flowlines and oil and gas pipelines, due to the higher number of vehicles and earthmoving activities.

The amount of air pollution generated over the productive life of oil or gas wells depends on the characteristics of the product and the production practices used. Emissions associated with production are usually considerably less than the emissions from well drilling. However, over the life of some production operations, emissions could exceed those of drilling operations. Wells that do not produce H₂S during production are less likely to cause air pollution than wells that do produce hydrogen sulfide. Oil and gas production operations would release gaseous pollutants such as CO, hydrocarbons, NO_x, and SO₂. These air pollutants would be released by separation facilities, disposal of liquid waste and unwanted gas, burning of waste petroleum products, routine emission of objectionable odors, and venting of noxious vapors from storage tanks. Using the recent analysis at Big South Fork National River and Recreation Area as an example (NPS 2012b), emissions from 36 active wells were estimated at 6.5 tons per year NO_x, and 61.2 tons per year VOCs, with nearly all 61 tons coming from storage and venting. This averages to 0.2 tons per year, per well, for NO_x and 1.7 tons per year, per well, for VOC emissions.

The impact on air quality from wells directionally drilled and produced from outside park boundaries are expected to be similar to those described for operations within park boundaries; however the intensity of impacts on air quality inside the park would vary with the location of the well and any prevailing winds. Directional wells in the past have been drilled within 100 to 1,500 feet from park boundaries, including Big Thicket (NPS 2005).

Impacts of Plugging and Reclamation

Increased vehicle use and removal of roads, pads, flowlines and pipelines could increase particulate matter emissions. Leaks and spills of hydrocarbons could occur during well plugging, shutting down and abandoning/removing flowlines and pipelines and use of heavy equipment and vehicles during reclamation activities, resulting in emissions of gaseous pollutants and presenting a potential source for explosion or fire. These impacts could be short-term and localized, but contribute to regional air quality impacts.

Impacts on air quality from reclamation of wells directionally drilled from outside the park boundaries could range based on the distance from the park boundary. These impacts would be expected to be similar to those described above. Impacts could be localized as well as contribute to regional air quality impacts.

Once wells are plugged and sites reclaimed, there would be no future emission associated with that operation.

Regulated Operations (Current and Future)

Activities inherent in oil and gas development may result in impacts on air quality. Impacts on air quality from ongoing or future permitted oil and gas production operations include those described above under “Typical Impacts of Oil and Gas Operations on Air Quality.” The primary effects on air quality are related to heavy equipment use, including the continuous use of a combustion engine during drilling activities, and releases of hydrocarbons from oil storage and venting.

Under alternative A, regulated operations are subject to the 9B regulations, which require that operating standards be met. Current operating standards include use of fuels and control technologies to minimize air emissions, avoid or minimize flaring of gas from wells, and use of less volatile solvents and chemicals during operation (see the NPS Operators Handbook (NPS 2006b, table 4.1)). In addition, under the current approval process for plans of operation, the NPS requires that operators meet the least damaging standard, which includes using the appropriate mitigation measures as recommended in the NPS Operators Handbook. The implementation of these measures, including spraying the ground and equipment with water to reduce particulate matter, reducing vehicle speeds, no open burning, and the use of low sulfur fuels, would reduce the extent or intensity of impacts on air quality.

Proper maintenance of gasoline and diesel-fueled engines and use of low sulfur fuels are important in minimizing exhaust emissions. The use of pollution control devices on vehicles (e.g., catalytic converters) would also reduce emissions. Inspection and maintenance of production equipment such as flares and treater facilities is necessary to ensure that deteriorated components and equipment are detected and replaced or repaired. Using the Big South Fork National River and Recreation Area analysis, it was estimated from the rate of bubbling on certain wells that VOC emissions from two open casing wells was approximately 28 tons per year, and 17 leaking shut-in wells were also estimated to release about 28 tons per year VOCs (NPS 2012b). The amount of VOCs released would vary depending on the severity of any one leak.

Impacts on air quality from currently regulated and future operations also include the effects of seismic surveys that are conducted within the category 1 park units and may be conducted in category 2 park units. Since 1998, 20 seismic surveys have been conducted in 6 parks for an average of 1.4 surveys per year. All but one have been 3-dimensional seismic surveys covering large geographic areas. Going forward, the level of seismic activity is expected to taper off to about one proposed survey per year (NPS 2013). Impacts of these surveys include those described above under “Typical Impacts of Oil and Gas Operations on Air Quality.” The exact extent of the surveys varies from operation to operation, however they typically result in short-term and minimal impacts on air quality.

When current operations end and wells are plugged and sites are reclaimed, impacts on air quality would be the same as described under “Typical Impacts of Oil and Gas Operations on Air Quality, Impacts of Plugging and Reclamation.” Provisions in the current regulations and approval process for well plugging, including those measures mentioned above (spraying active construction sites to reduce particulate matter and properly plugging wells) ensure that sites are reclaimed properly and benefits are realized.

Currently Exempt Operations

Under the no-action alternative, existing and future access-exempt operations and existing grandfathered operations would also result in impacts on air quality. These impacts are often more extensive or more severe compared to impacts from regulated operations because exempt operations are not subject to NPS operating standards and mitigation measures that would serve to reduce impacts on air quality.

Currently there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. Impacts on air quality from ongoing exempt operations include those described above under “Typical Impacts of Oil and Gas Operations on Air Quality.” However, because these operations are not fully regulated, there is a higher risk of impacts from continuous but minor leaks or release of hydrocarbons and treatment chemicals. Similar to regulated operations, the primary effects on air quality from exempt oil and gas operations stem from the use of heavy equipment and combustion engines and from releases from storage and venting during all phases of oil and gas activities.

For access-exempt operations, the amount of impact on air quality would potentially impact the federal properties, depending on the severity of the air emissions. Impacts on air quality are felt regionally as air emissions dissipate within an airshed. As noted in Geology and Soils, there will be no future grandfathered operations, but there could be future access-exempt operations, especially if shale development expands the number of parks affected by non-federal oil and gas development. For example, there could be a large number of new wells developing the Marcellus shale within the Upper Delaware Scenic and Recreation River, where land ownership is private. The number of wells that could be drilled to develop approximately 30,000 acres inside the unit could range from 50 (640-acre spacing) to several hundred assuming smaller spacing units. Whether surface locations are outside or inside the park unit, direct impacts on air quality could affect any of the accompanying airsheds which are in nonattainment (see “Air Quality” in chapter 3).

Site-specific data reveal several instances of currently grandfathered operations that have been documented as having some form of contamination on site, and the NPS has identified operating conditions at access-exempt sites that could potentially impact the air quality on federally owned lands, mostly related to an increased level of hydrocarbons and odors in the vicinity of wells. Appendix D presents information regarding the types of instances of known site contamination for each park unit with exempt operations. Air quality contamination issues were recorded at both Big South Fork and Cuyahoga Valley park units. In both instances, site visits recorded elevated hydrocarbon odors from leaking wellheads, often with bubbling or gas venting noted. At Cuyahoga Valley, 17 of 41 exempt wells have well head leaks and 4 wells had notable odors, and at Big South Fork, 10 of 122 wells were reported with notable odors from the well heads (see appendix D).

Directional Drilling

Under the no-action alternative, the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units avoids direct impacts to air quality within the park unit. However, wells directionally drilled and produced from outside park units to bottomholes beneath the park units would indirectly impact air quality on adjacent lands as well as presenting a risk of indirect impacts within the park units. Under the current 9B regulations, the NPS cannot require preventative mitigation measures, even if the operations may indirectly affect park resources by their proximity to park boundaries. For example, the use of diesel fuel with a higher sulfur content or poorly maintained construction equipment could result in greater emissions impacting the regional air quality, including a park’s class I designation. Intensity of impacts would depend on proximity of operations to the park units, site specific environmental conditions such as wind direction, and mitigation measures being employed.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limits, it is likely that many sites would have insufficient bonding for reclamation. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, remediation of well sites could be delayed indefinitely. Impacts on air quality from reclamation of well sites mainly occur during the plugging and reclamation process from the use of heavy equipment, so there would likely be no impact on air quality from the delay of remediation. For any leaking wells awaiting reclamation, there would be a continuing adverse impact on air quality from contaminated sites and open well casings, namely the continued release of VOCs.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations, a gap exists under the existing regulation. A prior owner who provides notice to the superintendent may request release of liability for financial assurance before the new owner posts its own financial assurance. It is anticipated that no equipment would operate during this period and therefore there would be no impacts on air quality. If the new owner defaults before posting financial assurance, the NPS would need to seek and acquire funding for cleanup or reclamation. Reclamation could be delayed indefinitely, which would also not impact air quality. However, similar to financial assurance, any leaking wells would continue to be a source of VOC emissions, resulting in adverse impacts on air quality.

Enforcement and Penalties

Under the no-action alternative, the lack of penalties for minor acts of noncompliance would result in less incentive for operators to comply fully with NPS operating standards. This increases the risk of unnecessary impacts to air quality from higher incidents of spills or leaks and associated releases of VOCs and odors.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages that result from privileged use of federal surface estate. This provision would have no impacts on air quality.

Cost Recovery

Under the no-action alternative, lack of cost recovery could have an indirect adverse impact on natural resources, including air quality, because additional money collected to support the NPS permitting, monitoring, and compliance programs could be used to enhance resource protection.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect air quality of the parks. Management planning, such as fire management, ORV, and oil and gas management plans, can result in greater protection for an airshed. Conversely, actions that cause disturbance of air quality would include activities such as prescribed burns, ORV use, mining, agricultural and logging activities, as well as any general development activities that include heavy construction equipment. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on air quality in the area of analysis (including both park lands and adjacent lands) and a brief summary of the cumulative impacts of these actions on air quality are listed in table 41.

TABLE 41. CUMULATIVE IMPACTS ON AIR QUALITY (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Air Quality
State greenhouse gas regulations	Long-term beneficial effects of reductions in greenhouse gas emissions as a result of new statewide regulatory revisions concerning greenhouse gas emissions requirements for the permitting of oil and gas operations.
Prescribed fires and fire management actions	Short-term adverse effects on air quality from controlled burns, namely, particulate matter; short and long-term impacts from fire line construction that requires digging and burning of surface litter, resulting in decreased visibility and increased particulate matter. Long-term beneficial effects of reduced fire occurrences with managed burns that reduce the possibility of catastrophic and high intensity fire and associated emissions.
NPS facility and road construction	Short-term adverse effects on air quality during road grading and construction using heavy equipment.
Trails development and maintenance	Short-term adverse effects on air quality from construction equipment during clearing, grading and surfacing of trails.
ORV use	Long-term adverse effects on air quality from the vehicle emissions.
Increased on-road vehicle use	Short- and long-term adverse impacts on air quality from increased regular traffic and vehicle use in and around parks.
Abandoned mine lands reclamation	Short-term adverse effects on air quality from any equipment use during reclamation-related disturbances.
Mining and logging activities	Short-term adverse effects on air quality from heavy equipment use.
Ranching, agricultural land uses	Short- and long-term adverse effects from operations that require heavy equipment for agricultural uses or emissions, as well as methane emission from concentrated livestock operations.
Land development: residential and nonresidential (commercial, industrial) land uses, including road construction	Short-term adverse effects on air quality from construction equipment and increased vehicle emissions.
Future oil and gas development on adjacent lands	Direct effects on airshed from additional operations; trends indicate that the exploration and production of shale gas, in particular, is anticipated to increase dramatically over the next 30 years.
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term adverse effects on air quality from reclamation related construction activities due to use of equipment and grading.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 42 includes an accounting of cumulative impacts that could affect air quality in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 42. CUMULATIVE IMPACTS ON AIR QUALITY – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Grazing; agricultural activities; residential development; road building; irrigation; visitor activities within the park.	Impacts on air quality from heavy equipment use during any construction activities as well as from farming equipment.
Big South Fork National River and Recreation Area	Actions include agricultural and forestry operations; commercial and residential development; road construction; existing and future coal mining operations; prescribed fires; and plugging and reclamation of abandoned wells including 39 under an ARRA funded program.	Impacts on air quality from heavy equipment use during any construction activities as well as from farming equipment. Increased particulate matter from prescribed burns. Adverse impacts from existing and future coal mining operation emissions and short-term emissions from construction equipment used during reclamation activities.
Big Thicket National Preserve	Actions include agricultural and forestry operations; urban and residential development; publicly owned facilities (water impoundments, water diversion structures, and sewage treatment); road construction; visitor use; and plugging of abandoned wells under an ARRA funded program.	Impacts on air quality from heavy equipment use during any construction activities as well as from farming equipment. Adverse impacts from existing and future coal mining operation emissions and short-term emissions from construction equipment used during reclamation activities.
Cumberland Gap National Historic Park	Park developments and visitor use; establishment of nearby State Parks; acquisition of Fern Lake and surrounding area.	Impacts on air quality from visitor vehicle emissions on roadways.
Cuyahoga Valley National Park	Residential, commercial, and transportation related land development and construction outside the park; ongoing park operations and maintenance. Land acquisitions and easements; agricultural use.	Impacts on air quality from heavy equipment use during any construction activities as well as from farming equipment and increased vehicles on roadways.
Gauley River National Recreation Area	Urban development. Transportation infrastructure improvements; mined land reclamation.	Impacts on air quality from heavy equipment use during any construction activities and increased vehicles on roadways. Short-term emissions from construction equipment used during reclamation activities.
Lake Meredith National Recreation Area	Actions include recreational activities; ranching and agriculture; residential development; road construction; water impoundments (i.e., Lake Meredith); recreational ORV use and other visitor use.	Impacts on air quality from heavy equipment use during any construction activities as well as from farming equipment. Increased vehicle emissions from off road vehicles. Adverse impacts from existing and future coal mining operation emissions and short-term emissions from construction equipment used during reclamation activities.
New River Gorge National River	Urban development. Transportation infrastructure improvements; mined land reclamation.	Impacts on air quality from heavy equipment use during any construction activities and increased vehicles on roadways. Short-term emissions from construction equipment used during reclamation activities.
Obed Wild and Scenic River	Catastrophic release in the past	Release of hazardous air emissions and particulate matter from fire contributed to short-term cumulative effects and possibly to longer-term particulate release from bare soils.

Overall, adverse and beneficial cumulative impacts would result from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated operations would have a beneficial impact on air quality in all category 1 and 2 park units, while exempt operations would continue to cause adverse impacts stemming primarily from the current lack of regulation. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development currently in the broader study area and the other cumulative actions affecting the resource in the entire study area.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in measurable impacts. Impacts on air quality from permitted operations relating to fuel burning, increase vehicles, and drilling would be as described for alternative A.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations would not change the direct impacts of the fuel burning and drilling activities; there would still be emissions released from the continuing industrial operations, including equipment and vehicle use. However, the change in regulation would reduce impacts on air quality from oil and gas operations because of the implementation of better operating practices, as described below, resulting in a potential reduction of adverse impacts on air quality. Impacts from site development and operation would include emissions from vehicles and heavy equipment during construction and maintenance as well as emissions released during drilling activities. However, once the rule change is implemented, these operations would need to meet the least damaging standard and other operating standards that are spelled out in the regulations. The operating standards and mitigation that would now apply to previously exempt operations include a prohibition on burning of vegetation, construction debris, or site-produced wastes; use of clean (i.e., low sulfur) fuels; proper maintenance of engines; use of pollution control devices on vehicles (e.g., catalytic converters); and inspection and maintenance of flares and treater facilities. Implementation of these requirements would result in reduced emissions and benefits to air quality.

Looking at site-specific information available for the nine parks with previously exempt operations, under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. Beneficial effects on air quality could result from the requirement to adhere to the standards and measures listed above. In addition to mitigation measures, some wells could be capped and closed. For open casing and shut-in wells, this would result in the reduction in VOC emissions, providing a long-term beneficial impact on air quality. Information from the Big South Fork oil and gas management plan (NPS 2012b) indicates that 2 open casings contribute about 28 tons per year VOCs, and 17 shut-in wells contribute about 28 tons per year.

Based on this and assuming similar conditions at the parks with exempt operations, capping and closing leaking wells would eliminate about 14 tons per year for each open casing and 1.6 tons per year for each leaking shut-in well. This would occur where operators choose to plug and reclaim the sites rather than continue operations. Site inspection reports from Cuyahoga Valley indicate that there are 16 leaking well heads. Big South Fork reports indicate 8 leaking wellheads, 10 with notable odors. Bringing these currently exempt oil and gas operations under the 9B regulations could result in a reduction in the severity of adverse impacts on air quality from oil and gas operations, particularly where outdated equipment with little emission controls are currently in use or where there are wellbore leaks and lower-emission equipment or repairs to well casings would be required. In addition to reducing emissions, the information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting park resources, including air quality.

Therefore, alternative B would result in long-term, direct beneficial impacts on air quality compared to the existing condition.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B impacts on air quality would be the same as described under alternative A.

Financial Assurance

Impacts affecting air quality, such as emissions from spills and open well casings, would be remediated in a more timely manner with the enhanced financial assurance requirements under alternative B. Impacts on air quality from seismic operations are minimal and would not be affected by the change in bonding, so this provision would not have much of an impact on the geophysical phase of oil and gas development. However, adequate bonding for drilling and production phases would provide funds for the NPS to reclaim sites sooner in the event of an operator default. This would result in a beneficial change to impacts on air quality compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. Similar to the no-action alternative, this provision would have no impacts on air quality.

Enforcement and Penalties

Under alternative B, the new penalty provision would provide incentives for an operator to comply with the 9B regulations and, in turn, facilitate protection of park resources and values, including air quality, resulting in a long-term indirect beneficial impact.

Compensation for Access across Federally Owned Land

Under alternative B, any reclamation activities that may be done in lieu of a fee would likely require the use of heavy equipment and would have short-term and very minor adverse impacts on air quality from construction equipment. Over the long-term, there would be no direct adverse impacts on air quality; however, reclamation would remove any sources of VOCs such as spills or open well casings, a long-term benefit compared to the existing condition.

Cost Recovery

Under alternative B, increased monitoring and evaluation of operations would allow for NPS to detect potential problems such as spills and releases, and ensure operational compliance, thereby mitigating potential impacts on many resources including air quality. Although permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to air quality to the extent these funds were applied to increased monitoring and evaluation of operations. As a result, under alternative B, cost recovery could have a beneficial impact on air quality compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, adverse and beneficial cumulative impacts would result from projects, plans and actions and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on air quality, as described in the above analysis. Bringing previously exempt operations under regulation would potentially add beneficial impacts on air quality. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing potential beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on air quality from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on air quality mainly due to the reduction in VOC emissions from the anticipated capping and closure of leaking wells.

Directional Drilling

The regulation of directionally drilled wells under alternative C may potentially remove a key incentive for operators to locate operations outside of park units. Operators may choose to select locations within park unit boundaries. However, air quality impacts extend beyond park boundaries. Moving wells into the park may increase impacts on localized areas of the park, but emissions would continue to impact the airshed on a regional level. Wells inside the park could have more localized effects from particulate emissions. There could be localized odors, which may be more prominent in areas closer to the wells, but

the location of odors would be dependent on climate and geography, as well as wind direction and speed. Similarly, there could be adverse effects to park air quality from wells outside the park boundary. However, under alternative C, wells both inside and outside the park would be subject to air quality requirements under the 9B regulations, therefore air quality overall would be improved, albeit with more localized impacts on park resources in general. Any adverse effects on air quality would include those impacts previously described under “Typical Impacts of Oil and Gas Operations on Air Quality” and include emissions from heavy vehicle equipment use.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, would facilitate protection of park resources and values, including air quality, resulting in a long-term indirect beneficial impact on air quality.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, oil and gas operations would continue to affect air quality where impacts cannot be avoided. However, the reduction in adverse impacts from bringing previously exempt operations under regulations benefit air quality. This is described further in the alternative B analysis. Alternative C would contribute to cumulative impacts mostly by adding potential beneficial impacts of bringing previously exempt operations under regulation. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on air quality from the existing condition. Continuing impacts on air quality from regulated and exempt operations would be expected. Impacts would be as described in the analysis, with a risk of more extensive adverse impacts near access-exempt or grandfathered sites unless those sites changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations would result in impacts such as vehicles and heavy equipment emissions and nitrogen oxides, volatile organic compounds, carbon monoxide, sulfur dioxide emissions, and odors from operating large engines, pumps and auxiliary equipment, resulting in short-term (construction activities and drilling operations) and long-term (roads, production operations, and flowlines and pipelines) adverse impacts on air quality. As a result, there would be continuing impacts from ongoing oil and gas activities within the park units. Plugging and reclamation of wells would result in short-term adverse and long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on air quality. Directionally drilled wells would continue to be a potential source of adverse effects, depending on the wind direction, proximity to the park, and mitigation measures employed. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including air quality, due to a possible lack of funding or enforcement that can reduce the ability to ensure lower emission equipment, prolonged VOC emissions from leaking wells, or require that low sulfur diesel is being used. Because the adverse effects under alternative A would be generally minimal during

operational phases and last for a relatively short time during construction, and would not result in widespread degradation of park air quality, these impacts would not be significant.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on air quality in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects as described above would accrue from the continued lack of federal regulation governing operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term indirect beneficial impacts on air quality, compared to the existing condition. Previously permitted operations would continue and there would be no change in effects on air quality from the existing condition, as described under the no-action alternative; however, previously exempt operations would be required to obtain an operations permit, which would result in long-term beneficial impacts on air quality from improved operating requirements from those operations. Bringing currently exempt oil and gas operations under the 9B regulations could result in a reduction in the severity of adverse impacts on air quality from oil and gas operations, particularly where outdated equipment with little emission controls are currently in use or where there are wellbore leaks and lower emission equipment or repairs to well casings would be required. Directionally drilled wells would continue to be a potential source of adverse effects, depending on the wind direction, proximity to the park, and mitigation measures employed, as described under alternative A. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would have potentially beneficial impacts from timely plugging and reclamation, compliance with 9B regulations, and increased monitoring and evaluation of operations compared to the existing condition. There would be short-term adverse impacts on air quality from the use of construction equipment during reclamation activities. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would be very limited due to use of emission controls and other mitigation such as remediation of spills and leaks, the impacts of this alternative would not be significant.

When combined with beneficial and adverse impacts from implementation of alternative B, cumulative impacts would be long term and both adverse and beneficial, and proposed 9B regulations would represent only a slight contribution to overall cumulative impacts on air quality in the study area. Adverse impacts of oil and gas development would be subject to regulatory review and limited, and would not be significant.

Alternative C

Under alternative C, impacts on air quality would also be primarily beneficial when compared to the existing condition. Impacts would be the same as those described under alternative B with the exception of previous exempt operations, directional drilling, and enforcement and penalties. Wells that are currently exempt from the regulations would become subject to standards and review that would provide the indirect benefit of minimizing impacts on air quality through establishing greater protections and emissions standards for equipment, resulting in long-term beneficial impacts. With expanded NPS jurisdiction for directional drilling under alternative C, more operators could be required to adhere to 9B regulations, resulting in the potential for beneficial impacts on air quality. Air quality impacts are felt

regionally, so the specific location of directionally drilling operations would not change the adverse impact on the airshed. However, there may be increased localized impacts from the release of particulates and odors if sites are located in the park. Under alternative C, enforcement and penalties would hold both operators and owners liable for compliance, which would increase the incentive for owners to ensure operators comply with 9B regulations, including all regulations which could reduce impacts on air quality. Therefore, alternative C would have long-term beneficial impacts on air quality. Because alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would be limited due to required mitigation and emission controls both inside and outside park boundaries, the impacts of this alternative would not be significant.

Similar to alternative B, cumulative impacts would be long-term and both adverse and beneficial, with alternative C contributing mostly beneficial impacts from bringing previously exempt operations under regulation. Adverse impacts of oil and gas development would be subject to regulatory review and limited, and would not be significant.

WATER RESOURCES

METHODOLOGY

Potential impacts on water resources are assessed based on the actions being proposed and characteristics of the water resources in the NPS parks. Resource-specific context for assessing impacts of the alternatives to water resources includes the following:

- the susceptibility of surface waters to pollution from runoff and spills from oil and gas sites
- the susceptibility of groundwater resources to contamination from drilling including hydraulic fracturing operations
- special designations given to surface or groundwaters found in the parks, such as Wild and Scenic Rivers or Outstanding Natural Resource Waters

For site-specific analysis, locations of the well pads of exempt operations were mapped relative to surface water bodies to aid in assessing impacts of those operations.

IMPACTS OF ALTERNATIVE A: NO ACTION

Typical Impacts of Oil and Gas Operations on Water Resources

Impacts from Geophysical Exploration

During the geophysical exploration phase, the loss or modification of vegetation, ORV use, and shothole drilling and detonation could result in increased sedimentation and turbidity and degrade water quality in nearby surface waters. For example, vegetation clearing would increase the potential for runoff into nearby surface waters by exposing the surface to water and wind, and survey crews traversing the area could also cause soil compaction, reducing the soil's water-holding and infiltration capacities. Cleared areas with compacted soils would be more subject to runoff of surface waters and accelerated erosion (Duiker 2004; Penn State 2009). This could lead to an increase in sediment load to nearby receiving surface waters. Also, the use of overland vehicles to transport equipment and personnel could increase the potential for turbidity if vehicles need to cross surface waters to access shothole locations and stir up bottom sediments.

Seismic operations generally have slight impacts on groundwater quantity or quality. Shothole detonation could dislodge or mobilize clays within an aquifer and cause a decrease in water quality or a reduction in flow. These effects are very uncommon and usually of short duration, unless the aquifer has limited geographic extent such as a localized perched watertable. Explosives that are occasionally left undetonated in shotholes could introduce small quantities of organic chemical compounds that are biodegradable in a few years. The quantities of explosives used in each individual shothole vary from one-half to 12 pounds and are typically spaced approximately 110–440 feet apart and therefore are not expected to appreciably affect groundwater chemistry. Soils such as fragipans that support surface waters in wetland areas (called aquitards) could conceivably be disturbed by shothole drilling and possibly fractured from shothole detonation. Design of shothole depths and explosive sizes used with respect to depths of aquitards would serve to minimize the risk of adverse effects, as would proper plugging of shotholes.

Impacts of Well Drilling and Production

During drilling and production, the construction, maintenance, and use of access roads, well pads, flowlines, and pipelines could increase soil erosion and consequently increase sedimentation and turbidity in nearby water bodies. Clearing of vegetation for these activities would expose soils to erosion, which could move downslope and increase turbidity and sedimentation in nearby surface waters. This could also create ruts or gullies that channel surface water flows. Road construction and the use of compacted road fill could also reduce infiltration rates on road surfaces, increasing surface runoff. Access roads and pads could also disrupt natural surface flow patterns and might result in an increase or decrease in the amount of water in some areas. Additional roads in the parks could increase access, which in turn could result in unauthorized additional land disturbance and erosion. If roads are used during wet conditions, rutting could result and might concentrate surface water flows. Slopes are particularly susceptible to erosion caused from road and well pad construction.

In addition to impacts associated with soil erosion and sedimentation, water resources could become contaminated if hazardous substances are released into them during drilling, production, servicing, or transport. In some locations, drilling operations could encounter formations with H₂S or high pressures and associated uncontrolled flows of oil, gas, brine, or freshwater. Blowouts could occur during drilling and release hydrocarbons, water, and drilling mud. The NPS recognizes that unplanned incidents associated with oil and gas operations such as well blowouts present a risk of release of contaminants that can adversely impact water resources. However, the incident rates for such incidents are low and are not a typical expectation of project implementation. In the event that the park's resources or values are damaged, the NPS could seek remedy both in the form of reclamation and monetary compensation.

There could also be accidental spills of drilling mud, diesel fuel, and other chemicals during drilling operations, or leaks from containers or flow lines. If drilling mud, fuels, or other chemicals are spilled on the ground and there is no impermeable liner on the well pad, the fluids could infiltrate into shallow aquifers or reach nearby surface waters, resulting in changes in water quality and possible violations of water quality standards if these are not detected and remediated. Contamination from the release of produced waters that contain salts and other well drilling fluids and chemicals could also impact surface and groundwaters. For example, such instances of leaks from salt-water disposal wells and subsequent contamination from mechanical problems and improper operating practices have been documented at Big Thicket National Preserve (NPS 2013). The risk of releases reaching more area of the well pad or off-site locations is greater for those wells that are exempt because these wells are not required to have some of the more protective measures that are required under the 9B regulations.

Risks to groundwater resources include leaching of surface leaks and spills into shallow groundwaters, and groundwater contamination from poorly cased or cemented wells. Well drilling and servicing can

include use of hydraulic fracturing well stimulation operations. These operations require large quantities of water, use a variety of chemicals to stimulate well production, and generate produced flowback or waste water. The term “hydraulic fracturing” has been expanded by the public beyond just the actual stimulation process to become the term for all activities associated with a well that is hydraulically fractured—from site construction through waste disposal. With the surge in the use of hydraulic fracture stimulation for shale development, the subject has drawn recent controversy.

The U.S. Environmental Protection Agency (USEPA) began a study on hydraulic fracturing used in coalbed methane reservoirs in 1999 to evaluate the potential risks to underground sources of drinking water. The study focused on coalbed methane reservoirs because they are typically closer to the surface and in greater proximity to underground sources of drinking water compared to conventional gas reservoirs. The USEPA published the coalbed methane study, entitled “Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs” (USEPA 2004). The published study received both internal and external peer review, and public comment on study design and incident information. The USEPA concluded that there was little to no risk of fracturing fluid contaminating underground sources of drinking water during hydraulic fracturing of coalbed methane production wells. The USEPA retained the right, however, to conduct additional studies in the future. As a precautionary measure, the USEPA also entered into a Memorandum of Agreement in 2003 with companies that conduct hydraulic fracturing of coalbed methane wells to eliminate use of diesel fuel in fracturing fluids.

Currently, the USEPA is conducting an expanded study to include all aspects of well development that use hydraulic fracturing at the request of Congress to better understand the potential impacts of hydraulic fracturing on drinking water resources (USEPA 2013c), and many states have added or are in the process of adding to regulations to address potential environmental impacts of these operations. The study will not be completed until 2014, and a Progress Report was released in December 2012 (USEPA 2012). Information in that report is preliminary (the draft peer-reviewed report is due in 2014) and cannot be used to draw conclusions about potential impacts on drinking water resources from hydraulic fracturing. However, the progress report provides a good overview of potential impacts that the USEPA is investigating. According to the report (USEPA 2012), hydraulic fracturing requires large volumes of water; since hydraulic fracturing fluids are usually water-based, with approximately 90 percent of the injected fluid composed of water (GWPC and ALL Consulting 2009 in USEPA 2012). Estimates of water needs per well have been reported to range from 65,000 gallons for coalbed methane production up to 13 million gallons for shale gas production, depending on the characteristics of the formation being fractured and the design of the production well and fracturing operation (GWPC and ALL Consulting 2009; Nicot et al. 2011 in USEPA 2012). Hydraulic fracturing operations require large quantities of supplies, equipment, water, and vehicles. Onsite storage, mixing, and pumping of hydraulic fracturing fluids may result in accidental releases, such as spills or leaks. Released fluids could then flow into nearby surface water bodies or infiltrate into the soil and near-surface groundwater, potentially reaching drinking water resources. The hydraulic fracturing fluid is pumped down the well at pressures great enough to fracture the oil-or gas-containing rock formation, and leaks could result from well construction failure. When the injection pressure is reduced, the direction of fluid flow reverses, leading to the recovery of flowback and produced water. This water may contain chemicals injected as part of the hydraulic fracturing fluid, substances naturally occurring in the oil-or gas-producing formation, hydrocarbons, and potential reaction and degradation products. Onsite transfer and storage of hydraulic fracturing wastewater may result in accidental releases, such as spills or leaks, which may reach nearby drinking water resources. The potential impacts on drinking water resources from flowback and produced water are similar to the potential impacts identified in the chemical mixing stage of the hydraulic fracturing operation, with the exception of different fluid compositions for injected fluids and wastewater (USEPA 2012).

It is NPS's experience that poor well construction, substandard well control practices, and surface mismanagement of contaminants have generally caused the impacts on ground and surface waters from hydraulic fracturing operations. Hydraulic fracturing of older wells that are not constructed to withstand the pressure of the operation could contaminate groundwater if the casing is breached. NPS requires that hydraulic fracturing be done using protective measures based on the least damaging provision of the current 9B regulations (see the section below "Regulated Operations (Current and Future)"). New operations or workovers on newer wells would be subject to not only state oversight, but also the 9B regulations that would require additional analyses and mitigation measures for any operations proposing to use hydraulic fracturing.

Because production could continue for 20 years or longer, the potential for leaks and spills of hazardous substances from production operations (including flowlines and pipelines) is greater than for any other phase of oil and gas operations. Adverse impacts on water quality could occur from accidental leaks and spills of drilling fluids or waste waters, hazardous waste spills (including diesel fuel), well blowouts, ruptures of flowlines and pipelines, and spills from tanker trucks. Chronic small leaks and spills could spread through various pathways, and over an extended period of time could become substantial and costly to remediate. The chances of undetected spills are greater if routine inspections are not performed. Faulty installation or corrosion of production casing might go undetected and could adversely impact groundwater, if hydrocarbons and/or produced waters migrate into an aquifer and contaminate groundwater. The severity of the impact would depend on the type of substance spilled (hydrocarbons, produced waters, chemicals, solvents, and fuels) and the size of area impacted, but impacts could be substantial.

The types of impacts related to runoff of sediments and contaminants for directionally drilled wells are expected to be similar to those described above for operations inside the park units. However, direct impacts to water resources in the park would not occur. The risk of indirect impacts and their intensity would vary with the location of the well with respect to the park boundary and direction of surface runoff. The risk of impacts on park resources would be greater for directionally drilled operations sited closer to park boundaries with surface gradients toward the park, where sediments and contaminants can be transported downslope into park units through adjacent streams, gullies, or overland flow. Severity of impacts would depend on proximity of operations to the park units; site specific environmental conditions, such as steepness and direction of slope and surface hydrology; sensitivity of resources, and mitigation measures being employed.

Impacts of Plugging and Reclamation

In cases involving older, idle wells in which roads and wellpads have become overgrown, clearing vegetation from oil and gas access roads and well pads and the use of heavy equipment and vehicles would temporarily increase localized erosion potential. In addition, there is the potential for release of liquid hydrocarbons and/or contaminating or hazardous substances into surface and groundwater from vehicles, wellhead equipment, or flowlines during well plugging and reclamation activities. These temporary activities could cause detectable, localized changes to water quality in the case of wells located near surface waters.

When drilling and production operations end, well plugging and surface reclamation results in overall beneficial impacts on water resources. Surface disturbance from earth moving equipment also occurs during plugging operations, which could result in sedimentation and turbidity in nearby waterways. However, these disturbances are temporary. There are also beneficial effects on water resources once cleanup is successfully completed and the site is reclaimed to natural conditions and processes. Reclamation involves returning the topography of a site to approximate the original contours, replacing any stockpiled soils, and reestablishing natural vegetation communities. Revegetating disturbed areas

provides erosion control in areas of previous impacts from oil and gas operations, limiting impacts from runoff. Sources of potential leakage such as wellhead equipment and flowlines are also removed during plugging and reclamation. Based on site history and conditions, park staff would conduct a more thorough testing for contamination at each site. If contamination is found, subsequent steps would be taken to remove or neutralize contaminating substances. As a result, there would be long-term beneficial effects on water resources once reclamation is complete.

Regulated Operations (Current and Future)

Activities inherent in oil and gas development may result in impacts on water resources. Impacts on water resources that would occur from ongoing or future permitted oil and gas production operations include those described above under “Typical Impacts of Oil and Gas Operations on Water Resources.” The primary effects on surface water resources from oil and gas operations stem from the potential for degradation of water quality from runoff of sediments and contaminants into surface waters near well sites. The main concerns regarding impacts on groundwater resources are the potential for contamination from well casing leakage, fracturing of subsurface formations, and use of groundwater during well drilling.

Regulated operations are subject to the 9B regulations, which require that operating standards be met. Current operating standards specifically within the regulations include precautions for well control, proper handling of wastes, site security, siting restrictions, and conduct of operations in a “safe and workmanlike manner (see current 36 CFR 9.41 – 9.46). Additional resource-specific standards and recommended actions to achieve them are included in the NPS Operators Handbook (NPS 2006b). In addition, under the current approval process for plans of operation, the NPS works with operators to identify the relevant resource and visitor value issues and operating standards on a site-specific basis, which leads to the appropriate mitigation measures being incorporated into approved plans of operations. Typical mitigation measures that minimize impacts on water resources from ongoing regulated wells include removal of contaminated soils, effective erosion control, proper secondary containment (including use of berms and liners and drip pans), regular pump jack maintenance, and removal of debris, waste, and equipment no longer needed in operations. The implementation of these measures would eliminate the source of pollutants or confine them to a controlled area, and would reduce the likelihood of contaminants reaching surface or groundwaters, thereby reduce the extent or intensity of impacts on water resources.

For all drilling, the current provisions under the 9B least damaging methods standards of approval for drilling in national parks would require that all water needed for these operations be either trucked in from outside the park or obtained from NPS-approved sources inside the park unit. Any waste waters would need to be stored in tanks (not pits) and trucked off site to an approved disposal facility. For any proposed hydraulic fracturing operation, the NPS would require and enforce all necessary safeguards to minimize or avoid impacts on water resources. Mitigation measures that could be required depending on the nature of the operation include requirements to disclose chemical composition, use less toxic chemicals, adhere to strict well construction standards, provide documentation of design parameters, obtain water from offsite sources, and dispose of any waste water outside the park, as previously mentioned.

For new operations, drilling and production operations must be sited 500 feet from all watercourses as required under 36 CFR 9.41(a), unless specifically authorized by an approved plan of operations, which reduces the likelihood of spills entering waterways. Also, careful siting of well pads away from moderate or steep slopes is required to minimize the potential of contaminating or hazardous substances being transported downslope into adjacent waters. The use of automatic shutoff valves on flowlines and pipelines on each side of any water-body crossing would reduce the volume of a hydrocarbon release and reduce the potential for contamination of the water due to pipeline releases. Additional mitigation

measures that would protect water resources include using the least contaminating and hazardous substances, storing the minimum quantity of contaminating and hazardous substances at operations locations, storing barrels or smaller containers of chemicals in “coffins” or other secondary containment, constructing berms and installing liners at drilling operations and at production facilities, increasing capacity within the firewall to accommodate high precipitation events, and including a spill notification and response plan in the plan of operations. All of these measures serve to reduce the potential release of contaminants to water resources or to confine spills so that potential for contaminants to reach ground or surface waters is reduced or eliminated. Primary and secondary containment systems, such as containerized mud systems, impermeable well pad liners, and berms around the perimeter of the well pad, should prevent the release of hazardous and contaminating substances into surface and groundwater, resulting in beneficial impacts to surface and groundwater resources through increased prevention of spills. Proper site containment and placement and cementing of casing through all usable aquifers according to the minimum standards should adequately protect groundwater from contamination with hydrocarbons and produced waters. Any operations involving hydraulic fracturing would be subject to additional analyses and mitigation measures to minimize impacts, as previously described, which would minimize the potential for contamination of ground or surface waters or overuse of water resources, a beneficial impact.

Impacts on water resources from currently regulated and future operations also include the effects of geophysical (seismic) surveys that are conducted within the category 1 park units and may be conducted in category 2 park units. Since 1998, 20 seismic surveys have been conducted in 6 parks for an average of 1.4 surveys per year. All but one have been 3-dimensional seismic surveys covering large geographic areas. Going forward, the level of seismic activity is expected to taper off to about one proposed survey per year (NPS 2013). Impacts of these surveys include those described above under “Typical Impacts of Oil and Gas Operations on Water Resources.” The exact extent of the surveys varies from operation to operation. However, current 9B regulations contain several provisions that serve to minimize or prevent impacts from seismic surveys. The current operating standards require that “Surface operations shall at no time be conducted within 500 feet of the banks of perennial, intermittent, or ephemeral watercourses” (36 CFR 9B). Natural drainage paths would be avoided when possible, and refueling of vehicles would not be done near surface waters to reduce the chances for spills. Also, under the current regulations, operations would need to meet the least damaging standard, so ground disturbance would be kept to a minimum. Operators would be required to assess thickness of aquitards and provide risk assessments if there is the possibility of fracturing aquitards and reaching groundwater. Operators would need to offset shotholes or use smaller explosives charts (mini shotholes) to prevent this type of impact. There may be a prohibition on building new roads or a requirement to use foot travel only in certain locations to avoid crossing streams and increasing erosion and sedimentation of surface waters. Spill response plans would be required, which would minimize the risk of spilled fuels reaching surface waters, and staging areas may be required to be located outside the park to prevent any spills from reaching park resources. Shotholes would be required to be properly plugged to prevent leaching of organic compounds contained in explosives to groundwaters. These stipulations would minimize impacts on groundwater resources from geophysical surveys.

Oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, including some that were designated to protect water resources. Under the Big Thicket National Preserve oil and gas management plan, the “Riparian Corridors SMA” consists of complexes of floodplain hardwood pine forests and up to 300 feet from banks of major streams (NPS 2005). Under the oil and gas management plan for Lake Meredith National Recreation Area, non-federal oil and gas operations may be permitted with certain operating stipulations within the “Park Boundary to the Estimated 500-Year Flood Elevation SMA,” and within the

“Estimated 500-Year Flood Elevation to the Estimated 100-Year Flood Elevation SMA” (if there is no practicable alternative). However, a “No Surface Use” stipulation, where new non-federal oil and gas operations would not be permitted, would apply “Below the Estimated 100-Year Flood Elevation SMA” (below 2948 feet) and in perennial, intermittent, or ephemeral watercourses, with a 500-foot setback from their banks (NPS 2002b). At Padre Island National Seashore, the oil and gas management plan identifies three freshwater ponds as sensitive resource areas totaling 108 acres to be closed to surface access associated with non-federal oil and gas operations (NPS 2000b). The permitting of future plans of operations within these park units would be subject to these SMA setbacks or other restrictions, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

When current operations end and wells are plugged and sites are reclaimed, impacts on water resources would be as described under “Typical Impacts of Oil and Gas Operations on Water Resources.” Provisions in the current regulations and approval process for well plugging ensure that sites are reclaimed properly and wells are plugged. Mitigation measures would be applied during plugging and reclamation operations to minimize potential long-term impacts on water resources. These measures include conducting activities within previously disturbed areas, using erosion-control structures (straw bales and silt fences), placing tanks at each well to capture any well fluids produced during plugging, and placing a liner around the wellhead and under all service vehicles to prevent contamination. Soil, hydrology, and native vegetation communities would be restored as soon as practicable after completion of the plugging operation to limit erosion and runoff. To protect groundwater, NPS also requires testing of plugs to verify they have been set at the correct depth and provide the intended wellbore isolation.

Current projections are that about 4 existing wells per year would be plugged and reclaimed (NPS 2013).

Currently Exempt Operations

Under the no-action alternative, existing and future “access-exempt” operations and existing grandfathered operations would also result in impacts on water resources. These impacts may be more extensive compared to impacts from regulated operations because exempt operations are not subject to NPS operating standards and mitigation measures that would serve to remove or reduce impacts beyond that required by state permitting. State permitting generally addresses sources of water quality impacts and includes requirements for adequate well construction but may allow for some practices that are not permitted by the NPS, such as the use of pits.

The following discussion provides more site-specific detail of the current and potential impacts on water resources from activities associated with these currently exempt operations. Currently there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. Impacts on water resources that would occur from ongoing exempt operations include those described above under “Typical Impacts of Oil and Gas Operations on Water Resources.” However, because these operations are not fully regulated, there is a higher level of risk of impacts from continuous but minor leaks, lack of erosion control measures, use of earthen pits, or location close to surface waters of all types, including streams, seeps, and springs. Similar to regulated operations, the primary effects on water resources from exempt oil and gas operations stem from the potential for contamination from oil and other substances and from sedimentation.

For access-exempt operations, the amount of disturbance to water resources would be of minimal consequence to the federal interest related to water. As noted in “Geology and Soils,” there will be no future grandfathered operations (their number is set and finite), but there could be future access-exempt operations, especially if shale development expands the number of parks affected by non-federal oil and gas development and includes parks where there is little federal surface ownership. For example, in and

around the Upper Delaware Scenic and Recreation River, where land ownership is private, the number of wells that could be drilled to develop approximately 30,000 acres inside the unit could range from 50 (640-acre spacing) to several hundred assuming smaller spacing units. Whether surface locations are outside or inside the park unit, direct impacts on water resources would be on private surface estate. However, nearly all issues related to indirect effects on federal property can be negated if all other federal, state, and local regulations are followed, and there are water quality requirements in place for these wells. The NPS would initiate regulatory controls only where those operations are causing, or could reasonably expect to cause, adverse impacts to federal interests. The NPS expects that perhaps 20 percent of the 78 wells in this class would warrant NPS regulation.

Exempt operations have the potential for continuing adverse impacts from improper waste disposal, lack of secondary containment or liners, and lack of a spill prevention plan. NPS inventory data (see appendix D) has documented many instances of soil contamination on grandfathered sites that do not rise to the level of warranting suspension, but which could affect water resources if contaminants are carried offsite to nearby waters. Poor operating practices at exempt sites sometimes leads to spills, leaks and other releases of oils, produced water, or other chemicals that can contaminate surface and groundwaters. Releases of oils or chemicals have not been cleaned up because of lack of regulation and associated oversight.

A review of 122 site inspection reports from Big South Fork revealed 8 sites with well head leaks, 14 exempt wells with spills, and 2 sites with tank battery or pump jack leaks. Several of the reports for Big South Fork included information on the size of the contaminated areas, which ranged from less than 10 square feet for 9 of the wells, to up to 2,000 square feet at one site and “the entire wellpad” for another. The field inspection report for well 2979 at Big South Fork indicates a 2,000-square-foot area of oil contamination with the presence of wetland and river nearby. Review of 41 site inspection reports at Cuyahoga Valley revealed 16 sites with wellhead leaks and 5 spills and contamination associated with operation and maintenance of the sites, and 11 tank battery leaks and 1 pump jack leak. Information about the extent of the spills was not recorded.

Although there is no documentation of releases from these operations reaching surrounding waters, the potential for surface runoff is present at sites with contaminated soils, and hydrocarbons can also be carried into the groundwater. Under the no-action alternative, issues of contamination at sites of exempt operations are expected to continue or to be cleaned up at the discretion of the operator, resulting in a continued potential for long-term adverse impacts on water resources if the contamination is not remediated in a timely manner. For access-exempt operations, impacts on water resources would be indirect because they would occur on non-federal lands.

In addition to contamination, exempt operations have impacts due to soil erosion and sedimentation. Erosion of soils has occurred at these sites because erosion control measures may not be adequate on the site or access roads, but this does not rise to the level of an imminent threat of significant injury. As noted in the “Geology and Soils” section, the majority of the soils in the category 1 park units (92 percent) have a moderate to high erosion potential, and the effects on water would depend on proximity to surface waters.

Table 43 presents site-specific information regarding proximity of exempt operations to surface waters. There are currently 319 exempt operations in category 1 park units, 82 of which are within 500 feet of surface waters.

Eighteen of the 20 waterbodies within 500 feet of exempt wells at Big South Fork National River and Recreation Area are perennial streams or rivers, which can be immediately downslope from wells, in the gorge, so that any releases could readily reach surface waters. At Cuyahoga Valley National Park, 12 of

the 20 exempt wells are also within 500 feet of perennial streams, and the remainder are close to lakes, ponds, or marshes. At Lake Meredith National Recreation Area, all of the wells are located in what is described as the inundation area of the lake, 14 of which are within zero feet of the lake shoreline, or in the water pool of the reservoir. Big Thicket National Preserve exempt wells are in or within 39 feet of water. For many of these wells, any release would easily reach surface waters so the potential for adverse effects is high. Also, the Big South Fork River is also recognized as being an Outstanding Natural Resources Water, as are the Obed River and Clear Creek. Cuyahoga Valley National Park also contains rivers that are designated as Outstanding Natural Resource Waters, and the Obed River is the only Wild and Scenic River in the category 1 park units. These waters are particularly vulnerable to disturbances from oil and gas operations.

TABLE 43. EXEMPT-STATUS WELLS LOCATED WITHIN 500 FEET OF SURFACE WATERS

Park Unit	Number of Exempt Operations	Number of Operations Located within 500 feet of Surface Waters	Closest Surface Water Features
Aztec Ruins National Monument	1	0	NA
Big South Fork National River and Recreation Area	152	20	Perennial Streams, Lakes/Ponds
Big Thicket National Preserve	2	2	Swamp/Marsh
Cumberland Gap National Historical Park	2	0	NA
Cuyahoga Valley National Park	87	23	Perennial Streams, Lakes/Ponds, Swamp/Marsh
Gauley River National Recreation Area	28	3	Perennial Streams
Lake Meredith National Recreation Area	41	31	Lake and Inundation areas
New River Gorge National River	1	1	Lake/Pond
Obed Wild and Scenic River	5	2	Riverine Wetlands

Directional Drilling

Under the no-action alternative, the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units avoids direct impacts to water resources within the park unit. However, wells directionally drilled and produced from outside park units to bottomholes beneath the park units would directly impact surface waters on adjacent lands as well as presenting a risk of indirect impacts within the park units. Under the 9B regulations, the NPS cannot require preventative mitigation measures, even if the operators may indirectly affect park resources by their proximity to park boundaries. For example, impacts could result from soil erosion and runoff, such as what happened when there was a blowout at well (not directionally drilled) near the Obed River, resulting in contamination of the river from oil and fire byproducts and sedimentation after the fire. The risk and intensity of impacts on park resources would increase for operations sited closer to park boundaries where water and sediment can be transported downslope into park units through streams, gullies, or overland flow. Intensity of impacts on park resources would depend on proximity of operations to the park units; site specific environmental conditions, such as steepness and direction of slope and surface hydrology; and mitigation measures being employed.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limits, it is likely that many sites would not have sufficient bonding for reclamation. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, remediation of well sites could be delayed indefinitely. Until well plugging and surface reclamation is completed, there would be loss of use and potential adverse impacts on water resources. Performance bond amounts rarely approach \$200,000 for seismic operations, so any impacts on water resources from these operations are not generally tied to inadequate bond amounts, and water resources impacts from seismic operations are typically minimal. However, delayed reclamation could result in immediate and unnecessary adverse impacts on water resources that could become long-term impacts.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations, impacts on water resources could result from leaks or spills that could occur with no financial assurance to cover the cost of cleanup if there is no performance bond in place. If the new owner defaults before posting financial assurance, the NPS would need to seek and acquire funding for cleanup or reclamation. Reclamation could be delayed indefinitely. Over the interim period, the NPS would suffer loss of use, and potential adverse impacts on water resources would continue until they were properly mitigated. These impacts would include adverse impacts on water quality from the potential release of hazardous or contaminating substances during drilling or production operations.

Enforcement and Penalties

Under the no-action alternative, the absence of penalties for minor acts of noncompliance would result in a continued lack of incentive for operators to comply fully with NPS operating standards. This increases the risk of unnecessary impacts to water resources from spills and increased erosion and sedimentation.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages and any associated impacts to water resources that result from privileged use of federal surface estate.

Cost Recovery

Under the no-action alternative, lack of cost recovery could have an indirect adverse impact on natural resources, including water resources, because additional money collected to support the NPS permitting, monitoring, and compliance programs could be used to enhance resource protection.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect water resources of the parks. Management planning, such as fire management, vegetation management, ORV, and oil and gas management plans, can result in greater protection for these resources. Conversely, actions that cause disturbance of these resources would include activities such as prescribed burns, ORV use, mining, agricultural and logging activities, as well as any general development activities that include excavation, grading, or construction. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on water resources in the area of analysis (including both park lands and adjacent lands) and a brief summary of the cumulative impacts of these actions on water resources are listed in table 44.

TABLE 44. CUMULATIVE IMPACTS ON WATER RESOURCES (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Water Resources
Prescribed fires and fire management actions	Short-term and long-term adverse effects on surface waters from erosion and sedimentation from burned sites and sites disturbed by fire line construction. Long-term beneficial effects of reduced fire occurrences with managed burns that reduce the possibility of catastrophic and high intensity fire and thereby improve vegetation cover and reduce runoff.
NPS facility and road construction	Possible short-term and long-term adverse effects on surface waters from site runoff, although would be minimized with proposer erosion and sedimentation control measures.
Vegetation management	Long-term beneficial effects of erosion control from improved vegetative cover, which hold soils in place and reduce sedimentation in nearby water bodies.
Off park industrial discharges	Discharges of a variety of pollutants to receiving streams that can enter parks.
ORV use	Short- and long-term adverse effects on surface waters if affected by runoff from compacted and eroded surface following vehicle-related disturbances to the soil surface.
Abandoned mine lands reclamation	Long-term beneficial effects of reduced erosion/runoff of contaminants to adjacent streams following reestablishment of vegetation cover; improvements to water quality through control and treatment of water discharges.
Mining and logging activities	Long-term adverse effects on surface waters from erosion and sedimentation stemming from legacy surface disturbances and vegetation removal and long-term effects of acid mine drainage.
Ranching, agricultural land uses	Short- and long-term adverse effects from operations that remove vegetation cover, compact soils, create ruts that increase potential for increased runoff to surface waters containing sediments, pesticides, and nutrients (fertilizers).
Land development: residential and nonresidential (commercial, industrial) land uses, including road construction	Short- and long-term adverse effects from compaction, erosion and sedimentation following construction-related disturbances, non point pollution from fertilizers, oils, chemicals used in lawn and grounds maintenance, plus continuing discharges to groundwater from septic systems and to surface waters from runoff containing pesticides and fertilizers.
Future oil and gas development on adjacent lands	Indirect adverse impacts on park waters from “spill-over effects” of sedimentation and contamination from surface runoff from nearby sites; possible contamination of groundwater resources from improperly designed or installed well bores; trends indicate that the exploration and production of shale gas, in particular, is anticipated to increase dramatically over the next 30 years.
Oil and gas well plugging and reclamation activities inside and outside of parks	Long-term beneficial effects of restoration of natural contours, topsoil and vegetation cover that minimizes surface runoff and removes sources of contamination and contaminated soils.
Recovery actions against operators that damage park resources under 54 USC 100721	Long-term beneficial effects of cleanup of areas and recovery of natural resources that have been damaged from oil and gas spills that affected park lands and resources.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 45 includes an accounting of cumulative impacts that could affect water resources in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 45. CUMULATIVE IMPACTS ON WATER RESOURCES – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Grazing; agricultural activities; residential development; road building; irrigation.	Soil compaction and rutting and reduced soil permeability can lead to increased erosion and sedimentation of surface waters. Animas River is listed as “impaired” due to sedimentation and temperature. Causes thought to be resource extraction, urban runoff, petroleum activities, and agriculture.
Big South Fork National River and Recreation Area	Actions include agricultural and forestry operations; commercial and residential development; road construction; existing and future coal mining operations; prescribed fires; and plugging and reclamation of abandoned wells including 39 under an ARRA funded program.	Soil compaction and rutting which has led to increased erosion and sedimentation of surface waters; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, which affect surface and groundwater quality, and mine tailings resulting in contaminated runoff and leaching into groundwaters; beneficial impacts from abandoned well plugging which prevents contamination of subsurface waters by providing for secure well casing and plugging. Pine Creek, Bear Creek, Roaring Paunch Creek, and Rock Creek are listed as “impaired” for mercury, siltation, low dissolved oxygen, organic enrichment, sediment toxicity, contaminated mine drainage, low pH. Causes thought to be oil and gas development and mine drainage.
Big Thicket National Preserve	Actions include agricultural and forestry (logging) operations; urban and residential development; publicly owned facilities (water impoundments, water diversion structures, and sewage treatment); road construction; and plugging of abandoned wells under an ARRA funded program.	Reduced soil permeability and increased erosion have affected surface waters through sedimentation; agricultural runoff, such as fertilizers and oil, and leachate from septic systems resulting in changed water quality; benefits from plugging of abandoned wells – site cleanup, grading and addition of soils, revegetation to hold soils in place and prevents runoff and sedimentation of surface waters and plugging prevents groundwater contamination. Pine Island Bayou and Village Creek segments are listed as “impaired” due to high metal content, low pH. Causes thought to be logging and oil and gas operations.
Cumberland Gap National Historic Park	Park developments and establishment of nearby State Parks; acquisition of Fern Lake and surrounding area.	Soil erosion and limited sedimentation from developments but benefits include acquisition of additional water resources in the park; Gap Creek has been listed as “impaired” due to high levels of bacteria.
Cuyahoga Valley National Park	Land development and construction outside the park; ongoing park operations and maintenance; agricultural use.	Soil compaction and rutting and reduced soil permeability can lead to increased soil erosion and sedimentation in surface waters; agricultural runoff, such as fertilizers, resulting in changed surface water chemistry or groundwater pollution. Cuyahoga River, Brandywine Creek, Tinkers Creek, and Chippewa Creek are listed as “impaired” due to organic enrichment and ammonia (agricultural runoff).

Park Unit	Cumulative Actions	Description of Impacts
Gauley River National Recreation Area	Urban development. Transportation infrastructure improvements; mined land reclamation and acid mine drainage.	Soil compaction and rutting and reduced soil permeability leading to increased erosion and sedimentation into surface waters. Beneficial cumulative impacts from mine reclamation include reduced rates of erosion and runoff; but Gauley River, Meadow River, and Peter's Creek are listed as "impaired" due to aluminum, fecal coliform, iron, manganese. Causes thought to be abandoned mine drainage.
Lake Meredith National Recreation Area	Actions include ranching and agriculture; residential development; road construction; water impoundments (i.e., Lake Meredith); recreational ORV use and other visitor use.	Loss of soils and soil compaction and rutting can lead to increased erosion and sedimentation; introduction of contaminants into lake waters from leaking fuels; effects to the water chemistry from increases or decreases in water levels and/or alter the duration and frequency of stream flows.
New River Gorge National River	Urban development. Transportation infrastructure improvements; mined land reclamation and acid mine drainage.	Soil compaction and rutting of soils and reduced soil permeability can lead to increased erosion and sedimentation in surface waters. Beneficial impacts from mine reclamation include reduced rates of erosion and runoff, but 14 streams are listed as "impaired" due to aluminum, CNA-biological, fecal coliform, iron, manganese, pH. Causes are mine drainage and unknown.
Obed Wild and Scenic River	Catastrophic release.	Contamination of surface waters from spill – oil and fire byproducts; sedimentation following fire (the Howard/White Unit No. 1 well blowout that caused impacts on water resources at Obed Wild and Scenic River).

Overall, adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated operations would have a beneficial impact on water resources in all category 1 and 2 park units, while exempt operations would cause adverse impacts stemming primarily from the current lack of regulation. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development occurring in the broader study area and the other cumulative actions affecting the resource in the entire study area.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be essentially no change under alternative B regarding requirements or approval processes for permits, required operating standards, or required mitigation measures for operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. The proposed regulations now spell out requirements for submission of operating permits that specifically address several measures to protect surface and groundwater resources, including a detailed list of submission requirements for well stimulation including hydraulic fracturing. Because adherence to these standards and permit requirements, while not codified, is already standard practice, the proposed regulatory revision would not result in measurable changes to how resource protection is provided or measurable impacts on water resources. Impacts on water resources from permitted operations relating to site contamination, erosion and sedimentation, and groundwater impacts would be as described for alternative A, no action.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations should minimize impacts of both potential sources of water contamination and possible erosion and sedimentation of surface waters located nearby, resulting in long-term beneficial impacts. Once the rule change is implemented, exempt operations would need to meet the least damaging standard and other permit application and operating standards that are spelled out in the regulations. The operating standards and mitigation that would now apply to previously exempt operations include removal of contaminated soils, effective erosion control, proper secondary containment around storage tanks, prohibition on earthen pits (must use containerized mud systems), leak detection and containment, required offsite disposal of drilling wastes, multiple liners on the drilling pad, and other spill prevention measures. Specific permit application requirements address the use of well stimulation techniques such as hydraulic fracturing. The implementation of these mitigation measures and required permit information would result in reduced erosion, remediation of contaminated soils, and a reduction of risk of future contamination. For those operations on private lands (previously access-exempt) where there is a reasonable chance of accidents affecting water resources on federal lands, bringing these operations within the scope of the 9B regulations will allow park managers to take a proactive approach to protecting the federal interest by ensuring that operations inside the park unit are conducted in a manner that offers the highest possible protection to a park's resources and values. The risk of impacts from spills that could reach park property would be substantially reduced by implementation of strong spill prevention, control, and countermeasure technologies.

As previously discussed, oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, which include streams and other water bodies. The permitting of future plans of operations within these park units would be subject to these SMA setback recommendations, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Looking at site-specific information available for the nine parks with previously exempt operations, under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. As a result, requirements to adhere to these standards and measures would result in beneficial effects on water resources. Information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting park resources, including water resources. Regulatory oversight under alternative B would also require that precautions be taken where possible to prevent impacts on rivers and streams with special designations such as Outstanding Natural Resource Waters or similar high quality designations.

Bringing currently exempt oil and gas operations under the 9B regulations would result in a reduction in the severity of adverse impacts on water resources from oil and gas operations, particularly where soils with a high susceptibility to soil erosion coincide with currently exempt sites that have a high potential risk for contamination, such as those present at Big Thicket National Preserve, as described in the "Geology and Soils" section. The risk of impacts on these sites would be reduced through the application of improved standards for the use of least damaging technologies (erosion control) at sites where,

presently, only the imminent threat standard or no standard applies. Also, operators would be responsible for the cleanup of released hydrocarbons, produced waters, or treatment chemicals on contaminated sites. Well sites with documented contamination are expected to be remediated more quickly. This more rapid response to the remediation of spills at sites identified as priorities for cleanup would reduce the extent of further damage to both surface and groundwaters. Therefore, alternative B would result in long-term, direct beneficial impacts on water resources at previously exempt operations.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B, impacts on water resources would be the same as described under alternative A.

Financial Assurance

Impacts affecting water quality such as spill- and leak-related effects and increased erosion and sedimentation, would be remediated in a timelier manner with the enhanced financial assurance requirements under alternative B. Impacts on water resources from seismic operations are not expected or not generally tied to inadequate bond amounts, and are generally very minimal, so this provision would not have much of an impact on this specific phase of oil and gas development. However, adequate bonding for drilling and production phases would provide funds to enable the NPS to reclaim sites sooner in the event of an operator default. This would result in a beneficial change to impacts on water resources compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. This would reduce the risk that the NPS would suffer unnecessary loss of use and potential adverse impacts on water resources.

Enforcement and Penalties

Under alternative B, the new penalty provision that would be established would provide incentives for an operator to comply with the 9B regulations. That would, in turn, facilitate protection of park resources and values, including water resources, resulting in a long-term indirect beneficial impact compared to the existing condition.

Compensation for Access across Federally Owned Land

Under alternative B, beneficial impacts on water resources may result from compensatory reclamation activities that may be done in lieu of an access fee. These activities would include restoration of disturbed areas, including legacy oil and gas sites, to natural conditions. Over the long-term, beneficial impacts on water resources would accrue from such reclamation measures employed under alternative B compared to the existing condition.

Cost Recovery

Under alternative B, increased monitoring and evaluation of operations that could be funded by permit application fees would allow for NPS to detect potential problems such as spills and releases, and ensure operational compliance, thereby mitigating potential impacts on many resources including water resources. Although permit application fees could be used for a variety of programs, benefits from cost

recovery could accrue to water resources to the extent these funds were applied to increased monitoring and evaluation of operations. As a result, under alternative B, cost recovery could have a beneficial impact on water resources compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, adverse and beneficial cumulative impacts would occur from projects, plans and actions, and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on water resources, as described in the above analysis. Bringing previously exempt operations under regulation would add beneficial impacts on water resources related to any additional requirements that NPS may have beyond state permitting requirements. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on water resources from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on water resources at the site-specific level of analysis.

Directional Drilling

The regulation of directionally drilled wells under alternative C would result in both direct and indirect beneficial effects to water resources beyond park boundaries either by application of NPS operating standards on operations located outside the unit, or by operators choosing a surface location inside the park boundary.

However, the application of regulations on surface and subsurface operations located outside of NPS boundaries may potentially remove a key incentive for operators to locate operations outside of park units. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed

(O'Dell pers. comm. 2013d) (see the "Socioeconomics" section). As a result of the changes in alternative C, operators may be more likely to select locations within park unit boundaries, thereby intensifying direct impacts on park resources, including water resources. If surface locations are sited within the park unit boundaries, adverse effects on park water resources would include those impacts previously described under "Typical Impacts of Oil and Gas Operations on Water Resources." and include increased erosion and sedimentation, changes to water quality from spills or releases, or from runoff from contamination on the site, and possible groundwater contamination from leaching of hazardous material spills and from casing leaks.

Therefore, alternative C would be likely to create additional long-term, direct adverse impacts on water resources within park units compared to the existing condition. However, a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, would facilitate protection of park resources and values, including water resources, resulting in a long-term indirect beneficial impact.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. There would also be effects on water resources that would occur from oil and gas operations that would continue to affect waters where impacts cannot be avoided, and benefits from bringing previously exempt operations under regulations and the resultant reduction in adverse impacts, as described in the alternative B analysis. Alternative C would contribute to cumulative impacts mostly by adding beneficial impacts of bringing previously exempt operations under regulation, but also by possibly adding adverse impacts from the change in directional drilling regulations that could result in more oil and gas development within park units as opposed to outside park boundaries. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on water resources from the existing condition. Continuing impacts on water resources from regulated and exempt operations would be expected. Impacts would be as described in the analysis, with an increased risk of more severe or extensive adverse impacts near access-exempt or grandfathered sites unless those sites changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations would result in impacts such as erosion and sedimentation of water bodies, contamination of water from leaks and spills and possible groundwater contamination from well casing leaks. As a result, there would be continuing impacts from ongoing oil and gas activities occurring within the park units. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have very minimal and generally localized effects on water resources. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated run off leaves the site and enters the park.

Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have small indirect effects on resources, including water resources, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts due to erosion or runoff. While state permitting requirements call for adequate well construction, they may also allow for some practices that are not permitted by the NPS, such as the use of pits, which presents a higher level of risk of impacts from continuous but minor leaks. Such instances of leaking wells are very rare, but if a spill were to occur, depending on the magnitude of the release, it could have a locally significant impact. However, such impacts would be localized and limited in duration and severity.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on water resources in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects as described above would accrue from the continued unregulated operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term indirect beneficial impacts to water resources, compared to the existing condition. Benefits would accrue primarily from reduced risk to water due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the no-action alternative. This would result in improved erosion/sedimentation control, storm water management, spill prevention and countermeasure actions, well plugging standards, and improved standards/required information for well stimulation including hydraulic fracturing operations compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Overall these regulatory improvements would result in long-term indirect beneficial impacts on water resources. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would be very limited in extent compared to the entire park area, and mitigation measures or stipulations would help prevent the degradation of water quality, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations. Adverse impacts of oil and gas development would be mostly localized, subject to regulatory review, and limited, and would not be significant.

Alternative C

Under alternative C, similar to alternative B, impacts of the regulatory changes would also be primarily beneficial when compared to the existing condition. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result

in long-term beneficial impacts on water resources because NPS standards would apply to locations both inside and outside the park. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts such as erosion and sedimentation, water contamination from leaks and spills, and possible groundwater contamination from well casing leaks within park boundaries, following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to water resources within park units compared to the existing condition, although these impacts would be localized and small in number. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Because alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would be limited in extent compared to the entire park area, and mitigation measures or stipulations would help prevent the degradation of water quality, the impacts of this alternative would not be significant.

Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans, and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial. Adverse impacts of oil and gas development would be mostly localized, subject to regulatory review, and limited, and would not be significant.

WETLANDS

METHODOLOGY

Potential impacts on wetlands are assessed based on the actions being proposed and characteristics of the wetland resources in the NPS parks, and disturbance to unique features that may be affected. Resource-specific context for assessing impacts of the alternatives on wetland resources includes the following:

- Disturbance or loss of wetland vegetation caused by the oil/gas development.
- Uniqueness of wetland functions and values (groundwater recharge, stormwater storage and discharge, unique habitats, etc.) that are intrinsic to wetlands and cannot be easily duplicated or replaced.
- Quality of the particular wetland being impacted related to the functions and values performed by that wetland and their ability to recover.

For site-specific analysis, locations of the well pads of exempt operations were mapped relative to known wetland resources (appendix C) in order to assess potential impacts from those operations.

IMPACTS OF ALTERNATIVE A: NO ACTION

Typical Impacts of Oil and Gas Operations on Wetlands

Overall impacts on wetland would include changes to wetland functions and values, impacts on rare and unique wetland communities; changes to hydrology; impacts on water quality from runoff and sedimentation; stormwater impacts; changes to the abundance and diversity of wetland plant species and wildlife use; the size and type of wetland affected; the area of disturbance; and wetland connectivity to adjacent habitats. Although soil, water, vegetation, and floodplain resources are addressed as separate topics in this EIS, they are also mentioned here because wetland areas often coincide with these other sensitive and ecologically important resources. For all phases of development, impacts to wetlands would

be avoided, mitigated, or compensated for under federal regulations, executive order directives, and NPS policy.

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on wetland communities can result from localized vegetation clearing, ground disturbance, and crossing of small wetlands and would depend on the type of survey done, the equipment and vehicles used, the type of vegetation, and the season of the year. Vegetation clearing and trimming for surveying and increased vehicular traffic associated with seismic investigations would be minimized to the extent possible. Vegetation trimmed during line placement would be minimal and expected to recover over the short term. The introduction or spread of nonnative invasive vegetation could occur during this phase as a result of vehicular traffic, but this would be relatively limited in extent during this phase.

Leaks and spills from refueling of vehicles used in the surveys could pollute soil and water, and harm or kill vegetation.

In many areas of the park units, the use of vehicles for geophysical exploration operations would not meet a technologically feasible least damaging standard, thereby eliminating the adverse impacts associated with their use. However, if permitted, surface disturbance from survey crews traversing the area during geophysical exploration could cause localized soil compaction and rutting and damage to vegetation. Soil Hydrologic Groups “C” and “D” typically found in lowland areas (wetlands and floodplains) are very susceptible to adverse impacts from oil and gas operations. In general, these soils have high clay contents, low permeability, are moderately to highly compactable, and have low infiltration rates and recharge potentials. Wet or saturated soils are the most sensitive to disturbance from vehicle use. As described in “Geology and Soils,” compaction reduces the soil’s water-holding and infiltration capacities which could increase runoff of surface waters and accelerate soil erosion (Duiker 2004; Penn State 2009) and ultimately degrade existing soil and wetland communities. Disturbance of existing unpaved surfaces and resultant road runoff or the crossing of small areas of wetlands along tributary streams may also affect surface water and wetland resources. Where soils are compacted or rutted, surface hydrology and plant growth could be altered (Archibald et al. 1997).

The majority of impacts associated with these surveys are limited in extent and severity, because of the temporary nature of the disturbance and localized area disturbed by survey crews.

Impacts of Well Drilling and Production

In areas where drilling and production operations would be permitted, the construction and maintenance of roads, well pads, flowlines, and pipelines in or adjacent to wetlands could require the placement of fill material, removal of vegetation, and disruption of soils and surface hydrology, which would alter beneficial wetland functions and values. Under federal regulations, executive order, and/or NPS policy, impacts to wetlands would be avoided, mitigated, or compensated for, but impacts could still occur. The types of impacts on wetlands associated with drilling and production could include not only the visible loss of vegetation and disruption to soils, but the effects on the functions and values of the wetland community. Wetland functions that may be affected include surface water storage; shoreline stabilization; stream flow maintenance; groundwater recharge; sediment removal and nutrient cycling; aquatic productivity support; and provision of plant and wildlife habitat. The degree to which a given wetland and its functions are impaired depends on a number of factors including wetland type (e.g., wet meadow versus forested), landscape position (riverine versus wet meadow), level of impairment or impact, and success of restoration efforts (FERC 2004; Archibald et al. 1997). Different wetland types have different levels of importance and performance for these various functions, and site-specific functions and values

would be assessed and included in the development of mitigation plans for any wetland disturbance that triggers NPS and section 404 permitting.

During site preparation, impacts on wetland occur as a result of vegetation clearing, grading, cutting, filling, and leveling of the site using heavy construction equipment. Use of smaller, light-weight, or other low-impact vehicles as well as timber mats would reduce impacts on soil and wetland resources and protect wetland functions such as shoreline stabilization, groundwater recharge, and plant and wildlife habitat. During drilling and production, the construction, maintenance, and use of access roads, well pads, flowlines, and pipelines could cause soil compaction and rutting, thereby degrading wetland function through reducing the soil's water-holding and infiltration capacities (Duiker 2004). This would in turn reduce the root penetration capabilities of vegetation and hinder plant growth and affect wetland function. Compaction and rutting of existing unpaved surfaces and resultant road runoff or the crossing of small areas of wetlands along tributary streams may also affect wetland functions by altering surface hydrology and degrading plant communities and potential wildlife habitat (Archibald et al. 1997).

In addition to construction-related impacts associated with development of access roads and well pads, there is a risk of impact on wetlands from releases of hazardous or contaminating substances during drilling or production operations. These releases could occur from leaking equipment. As described in Geology and Soils, the unintentional or accidental release of hazardous or contaminated materials also includes the risk of release of drilling mud, and contamination from the release of produced waters containing salts and other well drilling fluids could also impact wetland vegetation in the park units. These substances may contain relatively large concentrations of dissolved salts, particularly sodium chloride, and can have salt concentrations greater than ocean water. Salt stress is the major environmental factor that affects all vital plant processes such as growth, photosynthesis, protein synthesis, energy and lipid metabolism, and productivity (Parida and Das 2005). Instances of leaks from salt-water disposal wells and subsequent contamination occurring as the result of mechanical problems and improper operating practices have been documented at Big Thicket National Preserve (NPS 2013). Release of drilling muds, hydrocarbons, produced waters, or treatment chemicals could occur during drilling, production, or transport, with notable adverse impacts.

The types of impacts related to wetland resources for directionally drilled wells are expected to be similar to those described for operations inside the park units; however, direct impacts to wetlands in park units would not occur. The risk of indirect impacts and their intensity would vary with the location of the well with respect to the park boundary and direction of surface runoff. The risk of impacts on park resources would be greater for directionally drilled operations sited closer to park boundaries with surface gradients toward the park, where water and sediment can be transported downslope into park unit wetlands through adjacent streams, gullies, or overland flow. Severity of impacts would depend on proximity of operations to the park units; type of construction; site specific environmental conditions, such as steepness and direction of slope and surface hydrology; sensitivity of resources, and mitigation measures being employed.

Impacts of Plugging and Reclamation

When drilling and production operations end, well plugging and surface reclamation results in overall beneficial impacts on wetlands if conduct of operations had impacted wetlands. Although damage and loss of vegetation and soil disturbance during ground disturbing equipment occurs from plugging actions, these disturbances are temporary. There are also beneficial effects on wetland functions and values once cleanup is successfully completed and the site is reclaimed to natural conditions and processes.

Reclamation involves returning the topography of a site to approximate the original contours, and reestablishing natural wetland communities. Allowing vegetation in disturbed areas to recover provides erosion control in areas of previous impacts from oil and gas operations.

Clearing vegetation from oil and gas access roads and well pads and the use of heavy equipment and vehicles would temporarily increase localized erosion potential, causing increased turbidity and sedimentation in waterways, and alter surface water flows. In addition, there is the potential for release of liquid hydrocarbons and/or contaminating or hazardous substances into wetlands from vehicles, wellhead equipment, or flowlines during well plugging and reclamation activities. These temporary activities could cause detectable, localized changes to wetlands for wells located near surface waters. However, sources of potential leakage from wellhead equipment and flowlines are removed during the plugging and reclamation phase, reducing the overall impact.

Recovery of wetland communities would be primarily dependent on location, site conditions, precipitation, and type of wetland community desired. Except for forested and scrub-shrub wetlands which are slow to regenerate, most wetland communities in the park units would be expected to reestablish in a relatively short time. If access roads are not reclaimed, but continue to be used for other administrative purposes, adverse impacts on adjacent wetlands could occur if visitors travel off established routes. Despite this potential effect, restoration of native wetland communities associated with plugging and reclamation would ultimately have long-term beneficial impacts.

Impacts are based on the assumption that post-construction restoration efforts would be successful and no unforeseen conditions resulting from proposed oil and gas operations (e.g., potential spills) delay anticipated recovery rates. Note that a long-term or permanent affect or impact does not necessarily mean a permanent loss of wetland habitat. For example conversion of scrub-shrub or forested wetlands to herbaceous wetlands is considered a permanent impact on those woody wetland classes, but does not represent a complete loss of wetland habitat; whereas a permanent wetland loss would be a conversion of a wetland to an upland as a result of the construction of a well pad or access road.

In forested and scrub-shrub wetlands, the effects of plugging and reclamation would be longer term due to the longer period needed to regenerate a mature forest or shrub community. Scrub-shrub and forested wetlands that would be initially cleared (cut to ground surface) for oil and gas operations would be allowed to regrow over time following plugging and reclamation. This would be considered a long-term impact based on the slower growth rate of trees and shrubs, which may require decades for complete regeneration, if at all (Stanturf et al. 2001). Impacts on emergent wetlands affected within the park units would likely be short-term to long-term, with successful re-establishment within 3 to 5 years.

Reclaiming the well pads and access roads would have a beneficial impact on wetlands by reducing soil erosion and reestablishing surface drainage flows, once re-contouring and planting and establishment of native vegetation in disturbed areas is complete. As a result, there would be long-term beneficial effects on wetlands once reclamation is complete.

Indirect impacts on wetlands in the park units from reclamation of wells directionally drilled from outside the NPS boundary to bottomholes beneath NPS land could result in impacts similar to those described above for operations, but the intensity of impact would depend on proximity to the park unit, site-specific environmental conditions, and mitigation measures employed; therefore, impacts could range from no impact on wetlands, to localized or widespread short- to long-term adverse impacts.

Regulated Operations (Current and Future)

Activities inherent in oil and gas development may result in impacts on wetlands resources. Impacts on wetlands that would occur from ongoing or future permitted oil and gas production operations include those described above under “Typical Impacts of Oil and Gas Operations on Wetlands.”

During drilling and production activities, potential impacts within the footprint of the disturbance include the loss or disturbance of soils, vegetation, and hydrology where grading or construction of facilities had occurred; soil erosion and sedimentation associated with disturbed areas; and possible soil contamination from leaks and spills, leading to adverse impacts on wetland functions. Current data indicate that there are 215 wells under plans of operation in the category 1 park units. Direct surface disturbances from well pads range, on average, from 0.1 to 1 acre for non-directionally drilled operations, with the average area of road disturbance ranging from 0.4 to 1.2 acres per operation. Currently permitted operations are adversely affecting approximately 305 acres of soils. It is likely that some of these soils may be classified as hydric, or soils indicative of wetlands. The historic average of new drilling operations is about 4 proposals per year (NPS 2013). Therefore, approximately 6 additional acres per year could be impacted from future well development assuming those operations are not access exempt.

Regulated operations are subject to the 9B regulations, which require that operating standards be met. Current operating standards specifically within the regulations include precautions for well control, proper handling of wastes, siting restrictions, and conduct of operations in a “safe and workmanlike manner (see current 9B regulations, 36 CFR 9.41 – 9.46). Additional resource-specific standards and recommended actions to achieve them are included in the NPS Operators Handbook (NPS 2006b). In addition, under the current approval process for plans of operation, the NPS works with operators to identify the relevant resource and visitor value issues and operating standards on a site-specific basis, which leads to the appropriate mitigation measures being incorporated into an approved plan of operations. Typical mitigation measures that minimize impacts on wetlands during drilling and production operations include removal of contaminated soils, effective erosion control, proper secondary containment around storage tanks, regular pump jack maintenance, removal of debris, waste, and equipment no longer needed in operations, minimizing site disturbance through limiting vehicle activity, use of previously disturbed sites, and drilling of multiple wells on a single well pad. Possible site contamination from leaks and spills may lead to adverse impacts that could harm or kill vegetation, contaminate soils, and degrade wetland function and value. To reduce the chances for spills, natural drainage paths should be avoided when possible, and efficient refueling of vehicles should be employed. Requirements set forth in 36 CFR 9.41(a) state that “operations shall at no time be conducted within 500 feet of waterways, unless specifically authorized by an approved plan of operations.” This operating requirement substantially reduces the potential for adverse impacts on wetlands and adjacent streams. The implementation of these measures, along with those described for soils and vegetation, would reduce the extent or intensity of impacts on wetlands. In the event that direct and/or indirect impacts on wetlands cannot be avoided, mitigation to select a least-damaging site to locate operations would be required. In most cases, however, primary and secondary containment on a well pad should prevent the release of drilling muds, diesel fuel, oil and gas, and other substances beyond the well pad.

Impacts on wetlands from currently regulated and future operations also include the effects of geophysical (seismic) surveys that are conducted within the category 1 park units and may be conducted in category 2 park units. Since 1998, 20 seismic surveys have been conducted in 6 parks for an average of 1.4 surveys per year. All but one have been 3-dimensional seismic surveys covering large geographic areas. Going forward, the level of seismic activity is expected to taper off to about one proposed survey per year (NPS 2013). Impacts of these surveys include those described above under “Typical Impacts of Oil and Gas Operations on Wetlands.” The exact extent of the surveys varies from operation to operation. However, under the current regulations, operations would need to meet the least damaging standard so ground disturbance would be kept to a minimum, a 500-foot setback from waterbodies for surface operations would be established unless site-specific conditions and mitigation can accomplish the same level of protection at a lesser setback distance, and staging areas would be restricted to areas outside of the 100 year floodplain.

Oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, including some that were designated to protect wetlands. Under the Big Thicket National Preserve oil and gas management plan, the “Rare Forested Wetland Communities SMA” consists of four wetland community types, and the “Ecological Research and Monitoring Plots SMA” consists of the Royal Fern Bog Research Plot, which has a 150-foot offset in which no surface use is allowed (NPS 2005). At Padre Island National Seashore, the oil and gas management plan identifies the Laguna Madre and wind-tidal flats as sensitive resource areas totaling 58,790 acres to be closed to surface access associated with non-federal oil and gas operations (NPS 2000b). The permitting of future plans of operations within these park units would be subject to SMA setback or other restrictions, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Other mitigation measures available to limit direct and indirect adverse impacts on wetlands from geophysical exploration include keeping staging and fueling areas out of sensitive vegetation, using leak protection methods, providing for rapid cleanup of spills, properly plugging shotholes, developing and implementing an exotic weed control plan, and using existing roads for access whenever possible. In addition, consideration could be given to conducting surveys during drier seasons, if possible.

Adverse impacts occurring during exploration activities could be minimized with the use of smaller, light-weight, or other low-impact vehicles. Wide-tired or light-weight vehicles would rut soils less, minimizing disturbance to the root zone for wetland vegetation. Floatation-type tires would lessen compaction of wetland soils, avoiding ruts that may alter wetland hydrology. Under current environmental requirements included in recent plans of operation for seismic work, cutting of vegetation for survey lines is limited to a 3.5 to 6-foot width (understory vegetation only), and no tree limbs greater than 3 inches in diameter may be cut. The use of GPS is encouraged to reduce the need for line-of-sight surveys.

When current operations end and wells are plugged and sites are reclaimed, impacts on wetlands would be as described under “Typical Impacts of Oil and Gas Operations on Wetlands, Impacts of Plugging and Reclamation.” Provisions in the current regulations and approval process for well plugging ensure that sites are reclaimed properly and benefits are realized. Reclamation is required to be completed as soon as possible, and no later than 6 months following completion of operations (unless otherwise authorized). In addition, wetland areas directly and indirectly affected by operations must be restored to their preexisting elevations, and soil, hydrology, and native vegetation communities as soon as practicable or followed by appropriate compensatory mitigation for any unavoidable adverse impacts. Meeting the NPS requirement of leaving the site in a clean and safe condition in preparation for surface reclamation often involves placing liners underneath plugging equipment, using steel tanks instead of earthen pits, disposing of waste materials outside of the park, and employing erosion control measures on the access road and well site. NPS also requires testing of plugs to verify they have been set at the correct depth and provide the intended wellbore isolation.

For production operations, the NPS has found that plugging and reclamation of old wells has essentially offset drilling and production of new wells. In the category 1 park units, 215 well sites that are under permit would eventually be reclaimed, representing 305 acres of soils that would be restored. Current projections are that about 4 existing wells per year would be plugged and reclaimed (NPS 2013).

Currently Exempt Operations

Under the no-action alternative, existing and future “access-exempt” operations and existing grandfathered operations would also result in impacts on wetlands, and these impacts are often more

extensive or more severe compared to impacts that occur from regulated operations, because exempt operations are not subject to NPS operating standards and mitigation measures that would serve to remove or reduce impacts on wetland resources.

The following discussion provides more site-specific detail of the current and potential impacts on wetlands from activities associated with these currently exempt operations. Currently there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. Impacts on wetlands that would occur from ongoing exempt operations include those described above under “Typical Impacts of Oil and Gas Operations on Wetlands.” However, because these operations are not fully regulated, there is a higher level of risk of impacts from continuous but minor leaks, lack of erosion control measures, use of earthen pits, or location close to sensitive resources such as wetlands. For grandfathered operations, soils would be disturbed or removed on approximately 326 acres, and some portion of those would be classified as hydric (wetland) soils. Review of site-specific soil information available for the nine parks with previously exempt operations revealed three parks contain well sites with hydric soils, based only on GIS data and not field verification. Hydric soils are found at two well sites at Big Thicket National Preserve, 50 sites at Cuyahoga Valley National Park (13 access-exempt and 37 grandfathered), and 4 sites at Lake Meredith National Recreation Area; the majority of which are associated with wetlands at those sites. It is presumed that additional sites with hydric soils are present at other park units, but site-specific data was not available for each exempt well site. Appendix C presents information regarding the presence of hydric soils for each park unit with exempt operations. Leaks and erosion can result in long-term impacts that would last until reclamation is complete. Acres of wetlands along access roads that would continue to be adversely affected would vary, depending on the need for access and length of the roads.

For access-exempt operations, the amount of disturbance to wetlands would be of minimal consequence to the federal interest. As noted in “Geology and Soils,” there will be no future grandfathered operations (their number is set and finite), but there could be future access-exempt operations, especially in and around parks with little federal surface ownership, such as within the Upper Delaware Scenic and Recreation River. Whether surface locations are outside or inside the park unit, direct impacts on wetlands would be on private surface estate.

Exempt operations have the potential for continuing adverse impacts on wetland resources from improper waste disposal, lack of secondary containment or liners, and lack of a spill prevention plan. NPS inventory data in the form of site-specific contamination reports document several instances of soil contamination and erosion on exempt sites that do not rise to the level of warranting suspension (see appendix D and discussion in “Water Resources” section). Poor operating practices at these sites sometimes leads to spills, leaks and other releases of oils, produced water, or other chemicals that can contaminate soils and affect wetlands. Releases of oils or chemicals have contaminated soils and have not been cleaned up because of lack of regulation and associated oversight. Wetlands within and immediately adjacent to the park units may include unmitigated wetland losses of an undetermined acreage from oil and gas developments. Many of these sites have not been properly reclaimed, and it is anticipated that impacts have included direct loss of wetland vegetation and soils, and changes in hydrology around site structures and filled areas. Adverse impacts on wetlands resulting from instances of site contamination at exempt wells can occur both on private property and on nearby park property if contamination spreads off site. Under the no-action alternative, issues of contamination occurring at sites of exempt operations are expected to continue or to be cleaned up at the discretion of the operator, resulting in a continued potential for long-term adverse impacts on wetlands if the contamination is not remediated in a timely manner. For access-exempt operations, impacts on wetlands would be indirect because they would occur on non-federal lands.

Table 46 presents site-specific information regarding proximity of exempt operations to wetlands, based on park GIS data. There are currently 319 exempt operations in category 1 park units, 93 of which are within 500 feet of wetlands.

TABLE 46. EXEMPT-STATUS WELLS LOCATED WITHIN 500 FEET OF WETLANDS

Park Unit	Number of Exempt Operations	Number of Operations Located within 500 feet of Wetlands	Nearest Wetland Type (Distance from Operation)
Aztec Ruins National Monument	1	0	NA
Big South Fork National River and Recreation Area	152	20 (Note: 28 sites noted in or near wetlands, based on site inspections; see appendix D.)	PSS1A, Freshwater Forested/Shrub (0 feet)
Big Thicket National Preserve	2	2	PF01A, Freshwater Forested/Shrub (55 feet)
Cumberland Gap National Historical Park	2	0	NA
Cuyahoga Valley National Park	87	49	Unknown (0)
Gauley River National Recreation Area	28	2	R3RSA, Riverine (220 feet)
Lake Meredith National Recreation Area	41	18	PEM1/SS1Ch, Freshwater Emergent (24 feet)
New River Gorge National River	1	0	NA
Obed Wild and Scenic River	5	2	R3RB2H, Riverine (308 feet)

Wetlands within 500 feet of exempt wells include palustrine, riverine, and lacustrine systems and comprise approximately 2 percent of wetlands at Gauley River National Recreation Area, 1.5 percent at Big South Fork National River and Recreation Area, 17 percent at Obed Wild and Scenic River, and 40 percent of Big Thicket National Preserve. At Big South Fork, site inspection reports indicate 28 wells that are in or near wetlands; this indicates that the GIS data may miss smaller wetlands that would be seen during site visits. Lake Meredith National Recreation Area is comprised of 36 percent wetland habitat, and approximately 0.3 percent of the adjacent Alibates Flint Quarries National Monument, representing a rare resource in this arid region (NPS 2002a). Wetlands identified within Cuyahoga Valley National Park (approximately 5 percent of unit acreage) are primarily palustrine systems consisting of emergent marsh, scrub-shrub, and forested wetlands. These features, along with the associated wetland-dependent wildlife, are particularly vulnerable to disturbances from oil and gas operations.

Directional Drilling

Under the no-action alternative the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units avoids direct impacts to wetlands within park units. However, wells directionally drilled and produced from outside park units to bottomholes beneath the park units would directly impact wetland resources on adjacent lands as well as presenting a risk of indirect impacts within the park units. Under the 9B regulations, the NPS cannot require preventative mitigation measures even if the operations may indirectly affect park resources by their proximity to park boundaries. As noted in "Geology and Soils," the use of reserve pits instead of containerized mud systems could result in a greater risk for indirect impacts on park resources over time, and impacts could also occur from soil erosion, runoff, and spills. The risk and intensity of impacts would

increase for operations sited closer to park boundaries where water and sediment can be transported downslope into park units through streams, gullies, or overland flow into park wetlands. Intensity of impacts on park resources would depend on proximity of operations to the park units; site specific environmental conditions, such as steepness and direction of slope and surface hydrology; and mitigation measures being employed.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limits, it is likely that many sites would have insufficient bonding for reclamation. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, remediation of well sites could be delayed indefinitely. Until well plugging and surface reclamation is completed, there would be loss of use and potential adverse impacts on wetlands, if the sites that are delayed include wetland resources. Because performance bond amounts rarely approach \$200,000 for seismic operations, impacts on wetlands from these operations are not generally tied to inadequate bond amounts. However, delayed reclamation would result in immediate and unnecessary adverse impacts on wetlands that could become long-term impacts.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations impacts on wetlands could result from leaks or spills that could occur with no financial assurance to cover the cost of cleanup if there is no performance bond in place. If the new owner defaults before posting financial assurance, the NPS would need to seek and acquire funding for cleanup or reclamation. Reclamation could be delayed indefinitely. Over the interim period, the NPS would suffer loss of use, and potential adverse impacts on wetlands (if present) would continue until they were properly mitigated. These impacts would include adverse impacts on wetland function and value as well as productivity from the potential release of hazardous or contaminating substances during drilling or production operations.

Enforcement and Penalties

Under the no-action alternative, the absence of penalties for minor acts of noncompliance would result in a continued lack of incentive for operators to comply fully with NPS operating standards. This increases the risk of unnecessary impacts to wetlands from spills and increased erosion.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages and any associated loss of use of wetlands that result from privileged use of federal surface estate.

Cost Recovery

Under the no-action alternative lack of cost recovery could have an indirect adverse impact on natural resources, including wetlands, because additional money collected to support the NPS permitting, monitoring, and compliance programs could be used to enhance resource protection. Therefore, the non-recovery of costs under the no-action alternative would result in adverse impacts on wetlands.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect wetland resources. Management planning, such as fire management, vegetation management, ORV,

and oil and gas management plans, can result in greater protection for these resources. Conversely, actions that cause disturbance of these resources would include activities such as prescribed burns, ORV use, mining, agricultural and logging activities, as well as any general development activities that include excavation, grading, or construction. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on wetland resources in the area of analysis (including both park lands and adjacent lands) and a brief summary of the cumulative impacts of these actions on wetlands are listed in table 47.

TABLE 47. CUMULATIVE IMPACTS ON WETLANDS (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Wetlands
Prescribed fires and fire management actions	<p>Short-term and long-term adverse effects on wetland function and values from loss of productivity following removal of vegetation that may be preventing erosion and sedimentation; short and long-term impacts from fire line construction that requires digging and displacement of soils and loss of organic matter from burning of surface litter and topsoil and altered hydrology.</p> <p>Long-term beneficial effects of reduced fire occurrences with managed burns that reduce the possibility of catastrophic and high intensity fire; improved productivity and erosion control from vegetative cover that is established after these treatments.</p>
NPS facility and road construction	<p>Short-term and long-term adverse effects on wetland function and values from direct loss of soils and vegetation when removed for development, altered hydrology, and compaction and rutting of soils during road grading and construction using heavy equipment, increased road runoff and crossing of small areas of floodplains along tributary streams.</p>
Vegetation management	<p>Long-term beneficial effects of erosion control from improved vegetative cover, which hold soils in place. 500-foot setbacks and use of buffers for workspaces and siting.</p>
Trails development and maintenance	<p>Short-term and long-term adverse effects on wetland function and values from compaction and rutting during clearing, grading and surfacing of trails, and removal of vegetation in trail footprint, altered hydrology.</p>
ORV use	<p>Short- and long-term adverse effects on wetland function and values from compaction and rutting, erosion and sedimentation following vehicle-related disturbances to surfaces; altered hydrology.</p>
Abandoned mine lands reclamation	<p>Short-term adverse effects on wetland function and values from compaction and rutting during reclamation-related disturbances, altered hydrology.</p> <p>Long-term beneficial effects of improved surface (revegetation) and reduced erosion following reestablishment of natural contours and wetland restoration.</p>
Mining and logging activities	<p>Long-term adverse effects on wetland function and values from erosion stemming from legacy surface disturbances and vegetation removal and long-term effects of acid mine drainage on wetland function and values (degradation).</p>
Recreational use	<p>Short- and long-term adverse effects on wetland function and values from visitor activities including trampling and associated compaction and rutting.</p> <p>Long-term beneficial effects on wetland-dependent wildlife viewing and aesthetics.</p>
Ranching, agricultural land uses	<p>Short- and long-term adverse effects from operations that remove vegetation cover, compact soils, create ruts that increase potential for erosion.</p>
Land development: residential and nonresidential (commercial, industrial) land uses, including road construction	<p>Short- and long-term adverse effects on wetland function and values from direct loss of soils and vegetation in development footprint and compaction, rutting, erosion and sedimentation following construction-related disturbances; altered hydrology. Many private developments may not undergo rigorous regulatory oversight or permitting and have more impacts on wetlands, especially small isolated wetlands.</p>

Past, Present, and Reasonably Foreseeable Activity	Impacts on Wetlands
Future oil and gas development on adjacent lands	Direct effects on wetlands on adjacent property and indirect adverse impacts on wetlands soils from “spill-over effects” of sedimentation and contamination from surface runoff; possible severe adverse impacts in the unlikely event of a well blowout, fire, or major release; trends indicate that the exploration and production of shale gas, in particular, is anticipated to increase dramatically over the next 30 years.
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term adverse effects on wetland function and values from reclamation related disturbances due to use of equipment on site and grading. Long-term beneficial effects of restoration of natural contours and hydrology, topsoil and vegetation cover that protects soils from erosion; removal of sources of contamination and contaminated soils, wetland restoration.
Recovery actions against operators that damage park resources under 54 USC 100721	Long-term beneficial effects of cleanup of areas and recovery of natural resources that have been damaged from oil and gas spills that affected park lands and resources.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 48 includes an accounting of cumulative impacts that could affect wetland function and values in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 48. CUMULATIVE IMPACTS ON WETLANDS – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Grazing; agricultural activities; residential development; road building; irrigation; visitor activities within the park.	Loss of soils in footprints of development, soil compaction and rutting; reduced soil permeability; increased erosion; altered hydrology.
Big South Fork National River and Recreation Area	Actions include agricultural and forestry operations; commercial and residential development; road construction; existing and future coal mining operations; visitor use; prescribed fires; and plugging and reclamation of abandoned wells including 39 under an ARRA funded program.	Loss of wetlands in footprints of development, soil compaction and rutting; reduced soil permeability; increased erosion; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, which change soil chemistry, and mine tailings resulting in contaminated sediments and soils; beneficial impacts from abandoned well plugging.
Big Thicket National Preserve	Actions include agricultural and forestry operations; urban and residential development; publicly owned facilities (water impoundments, water diversion structures, and sewage treatment); road construction; visitor use; and plugging of abandoned wells under an ARRA funded program.	Loss of wetlands in footprints of development, soil compaction and rutting; reduced soil permeability; increased erosion and sedimentation; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, altered hydrology; benefits from plugging of abandoned wells – site cleanup, grading and addition of soils and restored hydrology, revegetation of wetlands.

Park Unit	Cumulative Actions	Description of Impacts
Cumberland Gap National Historic Park	Park developments and visitor use; establishment of nearby State Parks. Continued management of recommended wilderness in accordance with Wilderness Act and NPS policies; acquisition of Fern Lake and surrounding area.	Loss of wetlands in footprints of development; benefits include reduced rates of erosion and compaction and rutting through wilderness management and acquisition of additional wetland resources in the park.
Cuyahoga Valley National Park	Residential, commercial, and transportation related land development and construction outside the park; ongoing park operations and maintenance. Invasive and nonnative species management inside and outside of the park; land acquisitions and easements; agricultural use.	Loss of wetlands in footprints of development, soil compaction and rutting; reduced soil permeability; increased soil erosion; agricultural runoff, such as fertilizers and oil or herbicide use from vegetation management resulting in changed soil chemistry and vegetation community; altered hydrology; benefits from acquisition of additional wetland resources in the park.
Gauley River National Recreation Area	Urban development. Transportation infrastructure improvements; mined land reclamation.	Loss of wetlands in footprints of development, compaction and rutting; reduced soil permeability; increased erosion; altered hydrology. Beneficial cumulative impacts from mine reclamation include improvements to soil and vegetation structure and reduced rates of erosion.
Lake Meredith National Recreation Area	Actions include recreational activities; ranching and agriculture; residential development; road construction; water impoundments (i.e., Lake Meredith); recreational ORV use and other visitor use.	Loss of wetlands in footprints of development, soil compaction and rutting; introduction of contaminants into soils wetland, and lake sediments from leaking fuels; reduced permeability of soils, and increased erosion and sediment accumulation in surface waters; and indirect effects to the extent of flooded or saturated soils from increases or decreases in water levels and/or alter the duration and frequency of stream flows, altered hydrology.
New River Gorge National River	Urban development. Transportation infrastructure improvements; mined land reclamation.	Loss of wetlands in footprints of development, compaction and rutting of soils; reduced soil permeability; increased erosion; altered hydrology. Beneficial impacts from mine reclamation include improvements to soil and vegetation structure and reduced rates of erosion.
Obed Wild and Scenic River	Catastrophic release.	Contamination of soils and wetlands from spill – oil and fire byproducts; erosion of soils and sedimentation following fire.

Impacts on wetlands, specifically forested wetlands, are a concern due to the historically high rate of forested wetland losses and the long period necessary to restore forested wetlands and their functions. Although the annual rate of forested wetland loss has declined since the 1970s, due in part to federal agriculture programs, the loss of forested wetland acreage continues; almost 300,000 acres of forested wetland were lost between 1998 and 2004 (Dahl 2006). Freshwater forested wetlands have recently been affected by two processes: the conversion of forested wetland to and from other wetland types through cutting or maturation of trees, and the loss of forested wetlands where wetland hydrology has been destroyed (Dahl 2006). Because forested wetlands function at different levels, functional losses in individual areas may not be great when viewed as separate and single events. However, the cumulative loss of functions on a regional basis and the continued loss of forested wetland acreage in the United States could have greater overall impacts even as a result of the loss or conversion of small individual areas.

Overall, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated

operations would have a beneficial impact on wetlands in all category 1 and 2 park units, while exempt operations would cause adverse impacts stemming primarily from the current lack of regulation. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development occurring in the broader study area and the other cumulative actions affecting the resource in the entire study area.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in measurable impacts. Impacts on wetlands from permitted operations relating to site contamination, erosion and sedimentation, altered hydrology and adverse effects on wetland function and values would be as described for alternative A, no action.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations would not change the direct impacts of the footprint of well pads on wetlands; there would still be loss of wetland function and value due to temporary vegetation removal and reestablishment of original vegetation within the footprint of previous disturbance. However, the change in regulation would reduce indirect impacts and the risks of impacts on wetlands from oil and gas operations because of the implementation of better operating practices. Impacts from site development and operation would include soil compaction and increased soil erosion from vehicle compaction and rutting and vegetation clearing, leading to adverse impacts on wetland function and values; and degradation from the potential release of hazardous or contaminating substances during drilling or production operations. However, once the rule change is implemented, these operations would need to meet the least damaging standard and other operating standards that are spelled out in the regulations. The operating standards and mitigation that would now apply to previously exempt operations include removal of contaminated soils, effective erosion control, proper secondary containment around storage tanks, prohibition on earthen pits (must use containerized mud systems), leak detection and containment, required offsite disposal of drilling wastes, multiple liners on the drilling pad, and other spill prevention measures. This would result in reduced erosion, remediation of contaminated soils, and a reduction of risk of future contamination. In addition, ground disturbing operations would not be conducted within 500 feet of surface waters, including intermittent or ephemeral watercourses. Reclamation actions would begin as soon as possible, and no later than 6 months following completion of operations, unless a longer period of time is authorized in writing by the regional director. The proposed rules also require that operators use native soil material and grade to conform the contours to elevations that maximize hydrologic and ecologic functional value. For those operations on private lands (previously access-exempt) where there is a reasonable chance of accidents affecting wetlands on federal lands, bringing these operations within the scope of the 9B regulations will allow park managers to take a proactive approach to protecting the federal interest by ensuring that operations inside the park unit are conducted in a manner that offers the highest possible protection to a park's resources and values. The risk of impacts from spills that could reach park property would be substantially reduced by implementation of strong spill prevention, control, and countermeasure technologies.

As previously discussed, oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, including waterways and riparian corridors at Big Thicket and floodplains/water resources at Lake Meredith. The permitting of future plans of operations within these park units would be subject to these SMA setback recommendations, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Looking at site-specific information available for the nine parks with previously exempt operations, under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. Plans of operations would include specific protections for wetlands, which would be formalized through consultation with the NPS. Required compensatory mitigation for direct and indirect impacts on wetlands could be used to restore wetlands habitats and increase wildlife and aquatic species habitat values.

Bringing currently exempt oil and gas operations under the 9B regulations would result in a reduction in the severity of adverse impacts of oil and gas operations on wetlands, including possible site contamination from leaks and spills that may lead to adverse impacts that could harm or kill vegetation, contaminate soils, and degrade wetland function and value. The risk of impacts on these sites occurring on lands in the federal interest would be reduced through the application of improved standards for the use of least damaging technologies at sites where, presently, only the imminent threat standard or no standard applies.

Mitigation measures would minimize impacts on wetlands through the use of existing roads and pads to reduce soil compaction and vegetation damage, avoidance of known wetlands and natural drainage paths, removal of contaminated soils, effective erosion control, proper secondary containment around storage tanks, restrictions for refueling of vehicles near sensitive resources, regular pump jack maintenance, and removal of debris, waste, and equipment no longer needed in operations.

As a result, beneficial effects would occur to wetland resources through requirements to adhere to these standards and measures. Information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting park resources, including wetlands.

Also, operators would be responsible for the cleanup of released hydrocarbons, produced waters, or treatment chemicals on contaminated sites. Well sites with documented contamination are expected to be remediated more quickly as a result of new management provisions enforced under the 9B regulations. This more rapid response to the remediation of spills at sites identified as priorities for cleanup would reduce the extent of further damage to soils and wetlands, leading to improved site conditions under a more protective standard for operations and maintenance of sites with a documented history of contamination. Therefore, alternative B would result in long-term, direct beneficial impacts on wetlands on previously exempt operations.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B, impacts on wetlands would be the same as described under alternative A.

Financial Assurance

Impacts affecting wetland function and value, such as spill- and leak-related changes to soil and vegetation, soil compaction, rutting and increased erosion, and altered hydrology would be remediated in a more timely manner with the enhanced financial assurance requirements under alternative B. Impacts on wetlands from seismic operations are not generally tied to inadequate bond amounts, so this provision would not have much of an impact on this specific phase of oil and gas development. However, adequate bonding for drilling and production phases would provide funds for the NPS to reclaim sites sooner in the event of an operator default. This would result in a beneficial change to impacts on wetlands located on oil and gas sites compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. This would reduce the risk that the NPS would suffer unnecessary loss of use and potential adverse impacts on wetlands located on oil and gas sites because reclamation may be accelerated compared to the existing condition.

Enforcement and Penalties

Under alternative B, the new penalty provision would provide incentives for an operator to comply with the 9B regulations and, in turn, facilitate protection of park resources and values, including wetlands resulting in a long-term indirect beneficial impact compared to the existing condition.

Compensation for Access across Federally Owned Land

Under alternative B, beneficial impacts on wetlands may result from compensatory reclamation activities that may be done in lieu of an access fee. These activities could include the restoration of disturbed areas, including legacy oil and gas sites, to natural conditions. Over the long term, beneficial impacts on wetlands would accrue from such reclamation measures employed under alternative B compared to the existing condition, if wetlands are located on oil and gas reclaimed sites.

Cost Recovery

Under alternative B, increased monitoring and evaluation of operations that could be funded by permit application fees would allow for NPS to detect potential problems such as spills and releases, and ensure operational compliance, thereby mitigating potential impacts on many resources including wetlands. Although permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to wetlands to the extent these funds were applied to increased monitoring and evaluation of operations. As a result, under alternative B, cost recovery could have a beneficial impact on wetlands compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, both adverse and beneficial cumulative impacts would occur from projects, plans and actions and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on wetlands, as described in the above analysis. Bringing previously exempt operations under regulation would add substantial beneficial impacts on wetlands. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on wetlands from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on wetlands at the site-specific level of analysis.

Directional Drilling

The regulation of directionally drilled wells under alternative C would result in both direct and indirect beneficial effects to wetlands beyond park boundaries either by application of NPS operating standards on operations located outside the unit, or by operators choosing a surface location inside the park boundary.

However, the application of regulations on surface and subsurface operations located outside of NPS boundaries may potentially remove a key incentive for operators to locate operations outside of park units. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed (O’Dell pers. comm. 2013d) (see the “Socioeconomics” section). As a result of the changes in alternative C, operators may be more likely to select locations within park unit boundaries, thereby intensifying direct impacts on park resources, including wetlands, if development is permitted in or around a wetland area within the park boundaries. If surface locations are sited within the park unit boundaries, adverse effects on park wetlands would include those impacts previously described under “Typical Impacts of Oil and Gas Operations on Wetlands.” and include loss of use, soil compaction and rutting, increased erosion,

altered hydrology, changes to soil and vegetation productivity, and loss of wetland function and values related to exploration and production activities that would be associated with wells.

Therefore, alternative C could create additional long-term direct adverse impacts to wetlands within park units compared to the existing condition. However, a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, would facilitate protection of park resources and values, including wetlands, resulting in a long-term indirect beneficial impact on wetlands.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, there would also be effects on wetlands that would occur as a result of oil and gas operations that would continue to affect wetlands where impacts cannot be avoided, and benefits from bringing previously exempt operations under regulations and the resultant reduction in adverse impacts, as described in the alternative B analysis. Alternative C would contribute to cumulative impacts mostly by adding beneficial impacts of bringing previously exempt operations under regulation, but also by possibly adding adverse impacts from the change in directional drilling regulations that could result in more oil and gas development within park units as opposed to outside park boundaries. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on wetlands from the existing condition. Continuing impacts on wetlands from both regulated and exempt operations would be expected. Impacts would be as described in the analysis, with an increased risk of more severe or extensive adverse impacts near access-exempt or grandfathered sites unless those sites were changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations could include impacts on the functions and values of the wetland communities, changes to hydrology, impacts on water quality from runoff and sedimentation, stormwater impacts, changes to the abundance and diversity of wetland plant species and wildlife use, and wetland connectivity to adjacent habitats. As a result, there would be continuing impacts from ongoing oil and gas activities occurring within the park units. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on wetlands. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site and enters wetland resources. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including wetlands, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts. Because the adverse effects under alternative A would not result in widespread degradation or loss of wetlands in the parks, since

most wetlands would be avoided if possible, and the wetlands that cannot be avoided due to locational constraints would be subject to permitting and mitigation measures to decrease impacts to the wetland resource and/or to provide compensation, these impacts would not be significant.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on wetlands in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects as described above would accrue from the continued unregulated operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term indirect beneficial impacts on wetlands, compared to the existing condition. Benefits would accrue primarily from reduced risk to wetlands due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the no-action alternative. This would result in improved erosion/sedimentation control, storm water management, improved spill prevention (contamination) and countermeasure actions, as well as a reduction in altered hydrology and beneficial effects on wetland function and values, compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Overall these regulatory improvements would result in long-term indirect beneficial impacts on wetlands compared to the existing condition. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would be reduced because of the limited nature of disturbance compared to the entire park area and the success of required mitigation measures or stipulations in reducing loss or degradation of wetlands, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations. Adverse impacts of oil and gas development would be localized, subject to regulatory review, and limited, and would not be significant.

Alternative C

Under alternative C, impacts of the regulatory changes would also be primarily beneficial when compared to the existing condition, similar to alternative B. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells (operations located wholly on non-federally owned lands but still within the boundary of a park unit) not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on wetlands because NPS standards would apply to locations both inside and outside the park. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts such as changes to hydrology, changes to wetland connectivity, impacts on water quality from runoff and sedimentation, stormwater impacts, changes to the abundance and

diversity of wetland plant species and wildlife use within park boundaries, following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C could create additional long-term, direct adverse impacts to wetlands within park units compared to the existing condition. However, a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas, such as wetlands or floodplains. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on wetlands, primarily from bringing previously exempt operations under regulation. Because alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would be reduced because of the limited nature of disturbance compared to the entire park area, and the success of required mitigation measures or stipulations in reducing loss or degradation of wetlands, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial. Adverse impacts of oil and gas development would be localized, subject to regulatory review, and limited, and would not be significant.

FLOODPLAINS

METHODOLOGY

Potential impacts on floodplains are assessed based on the actions being proposed and characteristics of the floodplains in the NPS parks.

Locations of the well pads of exempt operations were mapped relative to known floodplain resources (appendix C) in order to assess potential impacts from those operations.

For all phases of development, impacts to floodplains would be avoided, mitigated, or compensated for under federal regulations, executive order directives, and NPS policy.

IMPACTS OF ALTERNATIVE A: NO ACTION

Typical Impacts of Oil and Gas Operations on Floodplains

Impacts from Geophysical Exploration

The primary impacts from geophysical exploration on floodplains are similar to those described for geology and soils, water resources, wetlands, and vegetation; and would be from the use of vehicles to transport equipment and personnel. Vehicles, if permitted to travel within the floodplains, could damage vegetation, reduce the soil's water-holding and infiltration capacities, increase compaction and rutting of soils, reduce the vegetation's root-penetration capabilities, and hinder plant growth and soil formation. Soil Hydrologic Groups "C" and "D" typically found in lowland areas (wetlands and floodplains) are very susceptible to adverse impacts from oil and gas operations. In general, these soils have high clay contents, low permeability, are moderately to highly compactable, and have low infiltration rates and recharge potentials. Wet or saturated soils are the most sensitive to disturbance from vehicle use. Exposed, compacted soils increase runoff of surface waters and accelerate soil erosion. Erosion of floodplain soils could increase turbidity and sedimentation in surface waters and wetlands.

In many areas of the park units, the use of vehicles for geophysical exploration operations would not meet a technologically feasible least damaging standard, thereby eliminating the adverse impacts associated

with their use. Drilling shotholes with a hand-held auger could be done in areas where vehicle access would cause damage and unnecessary loss of vegetation, or where soils would be damaged by vehicle use. The drilling of seismic shotholes are expected to have localized adverse impacts on floodplain resources. There could be small blow-outs measuring up to several feet in diameter from the detonation of explosives in seismic shotholes.

During the geophysical exploration phase, adverse impacts on floodplains can also result from localized vegetation clearing, ground disturbance, and crossing of floodplains and small areas of tributary floodplains, and would depend on the type of survey done, the equipment and vehicles used, and the season of the year. Surface disturbance from survey crews traversing the area during geophysical exploration could cause localized soil compaction and rutting and damage to vegetation. As noted in “Geology and Soils,” compaction reduces the soil’s water-holding and infiltration capacities which could increase runoff of surface waters and accelerate soil erosion (Duiker 2004; Penn State 2009) and ultimately degrade existing soil and floodplain resources. Disturbance of existing unpaved surfaces and resultant road runoff or the crossing of small areas of tributary floodplains may also affect floodplain resources. Where soils are compacted or rutted, surface hydrology and plant growth could be altered (Archibald et al. 1997). Leaks and spills from ORVs could damage vegetation, contaminate soils, and degrade surface and groundwater.

Impacts of Well Drilling and Production

Where drilling and production operations are permitted in floodplains, the construction and maintenance of access roads, well pads, flowlines, and pipelines could remove vegetation, expose soils to erosion and contamination, compact and rut soils, and introduce nonnative construction materials (i.e., gravel) and nonnative vegetation, reduce soil permeability, and introduce sediments in waterways. Impacts on floodplain resources would be short-term for construction activities and drilling operations and long-term for roads, production operations, and flowlines and pipelines.

During site preparation, impacts on floodplains occur as a result of vegetation clearing, grading, cutting, filling, and leveling of the site using heavy construction equipment. Use of timber mats or importing necessary fill material would reduce impacts on soil and floodplain resources. During drilling and production, the construction, maintenance, and use of access roads, well pads, flowlines, and pipelines could cause soil compaction and rutting, thereby reducing the soil’s water-holding and infiltration capacities. This would in turn reduce the root penetration capabilities of vegetation and hinder plant growth and affect floodplain function. Compaction and rutting of existing unpaved surfaces and resultant road runoff or the crossing of small areas of tributary floodplains may also affect floodplains by altering surface hydrology and degrading plant communities and potential wildlife habitat (Archibald et al. 1997).

In addition to construction-related impacts associated with development of access roads and well pads, there is a risk of impact on floodplains from releases of hazardous or contaminating substances such as drilling muds, hydrocarbons, produced waters, or treatment chemicals, during drilling or production operations, or during the transportation of hydrocarbons. These releases could occur from leaking equipment. As described in “Geology and Soils,” the risk of releases reaching more area of the well pad or off-site locations is greater for those wells that are exempt because these wells are not required to have the more protective measures that are required under the 9B regulations. Wet or saturated soils are the most sensitive to disturbance from overland vehicle use. Exposed, compacted soils increase runoff of surface waters and accelerate soil erosion. Degradation of the floodplain function and value would result from erosion of floodplain soils through increased turbidity and sedimentation in surface waters. Leaks and spills from ORVs occupying floodplains could harm or kill vegetation, and contaminate soils and surface and groundwater. Siting of drilling or production operations in a floodplain could also pose a

safety hazard to oil and gas operator's workers and contractors, NPS staff, and visitors due to the range in soil stability and the potential for flooding events.

Indirect effects on floodplains may also result if sites are developed outside, but adjacent to, floodplains/riparian areas, when lateral drainage is interrupted by road or well-site construction or increased erosion impacts the water quality of stream systems.

The types of impacts related to floodplain resources for directionally drilled wells are expected to be similar to those described for operations inside the park units. Direct impacts to floodplains within the parks would be avoided, but the intensity of impacts on floodplains would vary with the location of the well and its proximity to a floodplain. Impacts on park resources would be greater for directionally drilled operations sited closer to park boundaries, where water and sediment can be transported downslope into park unit floodplains through adjacent streams, gullies, or overland flow. The degree of impacts on floodplains would depend proportionally on proximity of operations to the park units; type of construction; site specific environmental conditions, such as steepness and direction of slope and surface hydrology; and mitigation measures being employed.

Impacts of Plugging and Reclamation

When drilling and production operations end, well plugging and surface reclamation results in overall beneficial impacts on floodplains. Well plugging, shutting down and abandoning/removing flowlines and pipelines, and use of heavy equipment and vehicles during reclamation activities could, however, increase soil erosion, alter surface water flows and hydrology, increase sedimentation in waterways, and contaminate soils, surface, and groundwater. Abandonment and reclamation could require cutting and clearing of vegetation. Reclamation involves returning the topography of a site to approximate the original contours, and reestablishing the natural floodplain. Allowing vegetation in disturbed areas to recover provides erosion control in areas of previous impacts from oil and gas operations.

Indirect impacts on floodplains in the park units from reclamation of wells directionally drilled from outside the park units to bottomholes beneath the park units could result in impacts similar to those described above for operations inside the park unit, but the intensity of impact would depend on proximity to the park unit, site-specific environmental conditions, and mitigation measures employed; therefore, adverse impacts could range from no impact on floodplains, to localized or widespread impacts that are short- to long-term in duration.

Regulated Operations (Current and Future)

Activities inherent in oil and gas development may result in impacts on floodplain resources. Impacts on floodplains that would occur from ongoing or future permitted oil and gas production operations include those described above under "Typical Impacts of Oil and Gas Operations on Floodplains." Within the footprint of the disturbance during drilling and production operations, potential impacts include the loss or disturbance of soils, vegetation, and hydrology where grading or construction of facilities had occurred; soil erosion and sedimentation associated with disturbed areas; and possible soil contamination from leaks and spills, leading to adverse impacts on floodplain functions. Current data indicate that there are 215 wells under plans of operation in the category 1 park units. Direct surface disturbances from well pads range, on average, from 0.1 to 1 acre for non-directionally drilled operations, with the average area of road disturbance ranging from 0.4 to 1.2 acres per operation. Currently permitted operations are adversely affecting approximately 305 acres of soils. It is likely that some of these soils may be classified as hydric, or soils commonly found in floodplains and wetlands. The historic average of new drilling operations is about 4 proposals per year (NPS 2013). Therefore, approximately 6 additional acres per year could be impacted from future well development assuming those operations are not access exempt.

Regulated operations are subject to the 9B regulations, which require that operating standards be met. Current operating standards specifically within the regulations include precautions for well control, proper handling of wastes, site security, siting restrictions, and conduct of operations in a “safe and workmanlike manner (see current 9B regulations, 36 CFR 9.41 – 9.46). Mitigation measures that are required to “floodproof” drilling and production operations include shutting-in the well, securing storage tanks, removing hydrocarbons from storage tanks and replacing them with water, and removing excess containers of contaminating and hazardous chemicals from the site. These measures would reduce the potential for site contamination from leaks and spills that would contribute to adverse impacts that could harm or kill vegetation, contaminate soils and surface waters, and degrade floodplain function and value.

Oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, including some that were designated to protect floodplains. Under the Big Thicket National Preserve oil and gas management plan, the “Riparian Corridors SMA” consists of complexes of floodplain hardwood pine forests and up to 300 feet from banks of major streams (NPS 2005). Under the oil and gas management plan for Lake Meredith National Recreation Area, non-federal oil and gas operations may be permitted with certain operating stipulations within the “Park Boundary to the Estimated 500-Year Flood Elevation SMA,” and within the “Estimated 500-Year Flood Elevation to the Estimated 100-Year Flood Elevation SMA” (if there is no practicable alternative). However, a “No Surface Use” stipulation, where new non-federal oil and gas operations would not be permitted, would apply “Below the Estimated 100-Year Flood Elevation SMA” (below 2,948 feet) and in perennial, intermittent, or ephemeral watercourses, with a 500-foot setback from their banks (NPS 2002b). At Padre Island National Seashore, the oil and gas management plan identifies the foredunes as a sensitive resource area totaling 3,200 acres to be closed to surface access associated with non-federal oil and gas operations (NPS, 2000b). The permitting of future plans of operations within these park units would be subject to SMA setback recommendations or other restrictions, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

In addition, under the current approval process for plans of operation, the NPS requires that operators meet the least damaging standard, which includes using the appropriate mitigation measures as recommended in the NPS Operators Handbook (NPS 2006b). Typical mitigation measures that minimize impacts on floodplains during drilling and production operations include restricting staging areas, access roads, and flowlines to areas outside the 100-year floodplain; removal of contaminated soils; effective erosion control; proper secondary containment around storage tanks; regular pump jack maintenance; removal of debris, waste, and equipment no longer needed in operations; minimizing site disturbance through limiting vehicle activity; use of previously disturbed sites; and drilling of multiple wells on a single well pad. This operating requirement should eliminate direct impacts on floodplains where this requirement would site operations outside of the floodplain, or where the floodplain is larger would substantially reduce the potential for adverse impacts.

To reduce the chances for spills, natural drainage paths would be avoided when possible, and efficient refueling of vehicles should be employed. Requirements set forth in 36 CFR 9.41(a) state that “operations shall at no time be conducted within 500 feet of waterways, unless specifically authorized by an approved plan of operations.” This operating requirement substantially reduces the potential for adverse impacts on floodplains and adjacent waterways. Non-federal oil and gas operations could be exempted from the 500-foot offset requirement as long as the operations utilize least-damaging methods to avoid or minimize adverse impacts on park resources and values. The implementation of these measures, along with those described for soils, wetlands, and vegetation, would reduce the extent or intensity of impacts on floodplains.

Impacts on floodplains from currently regulated and future operations also include the effects of geophysical (seismic) surveys that are conducted within the category 1 park units and may be conducted in category 2 park units. Since 1998, 20 seismic surveys have been conducted in 6 parks for an average of 1.4 surveys per year. All but one have been 3-dimensional seismic surveys covering large geographic areas. Going forward, the level of seismic activity is expected to taper off to about one proposed survey per year (NPS 2013). Impacts of these surveys include those described above under “Typical Impacts of Oil and Gas Operations on Floodplains.” The exact extent of the surveys varies from operation to operation, and the majority of impacts associated with these surveys are limited in extent and severity due to the temporary nature of the disturbance and localized area disturbed by survey crews. However, under the current regulations, operations would need to meet the least damaging standard so that ground disturbance would be kept to a minimum, a 500-foot setback from waterbodies for surface operations would be established unless site-specific conditions and mitigation can accomplish the same level of protection at a lesser setback distance, and staging areas, access roads, and flowlines would be restricted to areas outside of the 100-year floodplain, where practicable.

Several additional mitigation measures provided for under existing the 9B regulations would help to minimize impacts on floodplain resources. The construction of new roads for geophysical exploration would not be permitted under current policy. Vehicle use would be prohibited on roads when they are wet enough to cause damage to the roadbed. ORV travel would not be permitted on saturated soils to prevent soil compaction or rutting (particularly in floodplains and wetlands).

Other mitigation measures available to limit direct and indirect adverse impacts of geophysical exploration on floodplains include keeping staging and fueling areas out of sensitive vegetation, using leak protection methods, providing for rapid cleanup of spills, properly plugging shotholes, and reducing vehicle impact by using existing roads for access whenever possible. In addition, consideration could be given to conducting surveys during drier seasons, if possible.

Upon completion of operations, any areas damaged from drilling and production or geophysical exploration would be reclaimed. When current operations end and wells are plugged and sites are reclaimed, impacts on floodplains would be as described under “Typical Impacts of Oil and Gas Operations on Floodplains.” Provisions in the current regulations and approval process for well plugging ensure that sites are reclaimed properly and benefits are realized. Reclamation is required to be completed as soon as possible, and no later than 6 months following completion of operations (unless otherwise authorized). In addition, floodplain areas directly and indirectly affected by operations must be restored to their preexisting elevations, and soil, hydrology, and native vegetation communities as soon as practicable, or followed by appropriate mitigation for any unavoidable adverse impacts.

Meeting the NPS requirement of leaving the site in a clean and safe condition in preparation for surface reclamation often involves placing liners underneath plugging equipment, using steel tanks instead of earthen pits, disposing of waste materials outside of the park, and employing erosion control measures on the access road and well site. NPS also requires testing of plugs to verify they have been set at the correct depth and provide the intended wellbore isolation.

For production operations, the NPS has found that plugging and reclamation of old wells has essentially offset drilling and production of new wells. In the category 1 park units, 215 well sites that are under permit would eventually be reclaimed representing 305 acres that would be restored. Current projections are that about 4 existing wells per year would be plugged and reclaimed (NPS 2013).

Currently Exempt Operations

Under the no-action alternative, existing and future “access-exempt” operations and existing grandfathered operations would also result in impacts on floodplains, and these impacts are often more extensive or more severe compared to impacts that occur from regulated operations, because exempt operations are not subject to NPS operating standards and mitigation measures that would serve to remove or reduce impacts on floodplain resources.

The following discussion provides more site-specific detail of the current and potential impacts on floodplains from activities associated with these currently exempt operations. Currently there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. Impacts on floodplains that would occur from ongoing exempt operations include those described above under “Typical Impacts of Oil and Gas Operations on Floodplains.” However, because these operations are not fully regulated, there is a higher level of risk of impacts from continuous but minor leaks, lack of erosion control measures, use of earthen pits, or location close to sensitive resources such as wetlands and floodplains. For grandfathered operations, based on the number of wells that have been developed in all of the category 1 park units, soils have been disturbed or removed on approximately 326 acres, and a portion of these are classified as hydric (wetland) soils, resulting in long-term impacts lasting until reclamation is complete. Review of site-specific soil information available for the nine parks with previously exempt operations, revealed three parks contain exempt well sites with hydric soils, based on GIS data and not field verification. Hydric soils are found at 2 well sites at Big Thicket National Preserve, 50 sites at Cuyahoga Valley National Park (13 access-exempt and 37 grandfathered), and 4 sites at Lake Meredith National Recreation Area, the majority of which are associated with wetlands or floodplains at those sites. Appendix C presents information on the presence of hydric soils and associated floodplains available for the nine parks with previously exempt operations. The average area of road disturbance ranges from 0.4 to 1.2 acres per operation. Acres of floodplains along these access roads would continue to be adversely affected would vary, depending on the need for access and length of the roads.

For access-exempt operations, the amount of disturbance to floodplains would be of minimal consequence to the federal interest. As noted in “Geology and Soils,” there will be no future grandfathered operations (their number is set and finite), but there could be future access-exempt operations, especially if shale development expands the number of parks affected by non-federal oil and gas development. For example, there could be a large number of new wells developing the Marcellus shale within the Upper Delaware Scenic and Recreation River, where land ownership is private. The number of wells that could be drilled to develop approximately 30,000 acres inside the unit could range from 50 (640-acre spacing) to several hundred assuming smaller spacing units. Whether surface locations are outside or inside the park unit, direct impacts on floodplains would be on private surface estate.

Exempt operations have the potential for continuing adverse impacts on floodplains from improper waste disposal, lack of secondary containment or liners, and lack of a spill prevention plan. NPS inventory data has documented several instances of soil contamination and erosion on grandfathered sites that do not rise to the level of warranting suspension. Discussion of specific soil contamination at the sites is previously discussed in the “Geology and Soils” section. Appendix D also provides information on oil and gas sites with documented records of contamination for the park units based on site inspection records available for Big South Fork National River and Recreation Area and Cuyahoga Valley National Park. Review of 122 site inspection reports from Big South Fork revealed 14 exempt wells with spills and contamination associated with operation and maintenance of the sites. Several of the reports from Big South Fork included information on the size of the contaminated areas, which ranged from less than 10 square feet for 9 of the wells, to up to 2,000 square feet at one site and “the entire wellpad” for another. Review of 41 site inspection reports at Cuyahoga Valley revealed 16 sites with wellhead leaks and 5 spills and contamination associated with operation and maintenance of the sites, and 11 tank battery leaks.

Information about the extent of the spills was not recorded. Poor operating practices at these sites sometimes lead to spills, leaks and other releases of oils, produced water, or other chemicals that can contaminate soils and degrade floodplain function. Releases of oils or chemicals have contaminated soils and have not been cleaned up because of lack of regulation and associated oversight. Floodplains within and immediately adjacent to the park units may include unmitigated impacts of an undetermined acreage from oil and gas developments. Many of these sites have not been properly reclaimed, and it is anticipated that impacts have included direct loss of wetland and floodplain vegetation and soils, and changes in hydrology around site structures and filled areas. Adverse impacts on floodplains resulting from instances of site contamination at exempt wells can occur through decreases in floodplain value and function, both on private property and on nearby park property if contamination spreads off site. Under the no-action alternative, issues of contamination occurring at sites of exempt operations are expected to continue or to be cleaned up at the discretion of the operator, resulting in a continued potential for long-term adverse impacts on floodplains if the contamination is not remediated in a timely manner. For access-exempt operations, impacts on floodplains would be indirect because they would occur on non-federal lands.

Table 49 presents site-specific information regarding proximity of exempt operations to floodplains in category 1 park units (based on GIS analysis of information obtained from the parks). There are currently 319 exempt operations in category 1 park units, 58 of which are within 500 feet of the 100-year floodplain.

TABLE 49. EXEMPT-STATUS WELLS LOCATED WITHIN 500 FEET OF THE 100-YEAR FLOODPLAIN

Park Unit	Number of Exempt Operations	Number of Operations Located within 500 feet of the 100-year Floodplain	Closest Floodplain distance from operation (in feet)
Aztec Ruins National Monument	1	0	NA
Big South Fork National River and Recreation Area	152	31	1 within floodplain (Note: 10 sites noted in or near floodplains, based on site inspections; see appendix D.)
Big Thicket National Preserve	2	2	2 within floodplain
Cumberland Gap National Historical Park	2	0	NA
Cuyahoga Valley National Park	87	15	7 within floodplain
Gauley River National Recreation Area	28	4	68
Lake Meredith National Recreation Area	41	2	2 within floodplain
New River Gorge National River	1	0	NA
Obed Wild and Scenic River	5	4	279

Operations within 500 feet of the 100-year floodplain are found at Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Gauley River National Recreation Area, Lake Meredith National Recreation Area, Big Thicket National Preserve, and Cuyahoga Valley National Park. Specifically, 12 exempt operations are located within a floodplain according to GIS data, with Cuyahoga Valley National Park having 7 of these sites. Site inspection forms from Big South Fork indicate that

there are 10 sites with floodplains noted on site. Appendix C presents additional information regarding distance to 100-year floodplains for the nine parks with previously exempt operations. Portions of individual NPS parks within category 2 park units are likely to be located within these 100-year floodplains and include coastal floodplains and rivers. These are also subject to high watertable conditions and the drainage and flooding issues that often result from storm events. Data and information on specific flood zones varies widely across the units of the national park system.

Directional Drilling

Under the no-action alternative the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units avoids direct impacts on floodplains within the park unit. However, wells directionally drilled and produced from outside park units to bottomholes beneath the park units would directly impact floodplain resources on adjacent lands as well as presenting a risk of indirect impacts within the park units. Under the 9B regulations, the NPS cannot require preventative mitigation measures even if operations may indirectly affect park resources by their proximity to park boundaries. Impacts could occur from contamination, soil erosion, runoff, spills, and improper flood-proofing which would be similar to those previously described for wells located in park units, and the risk and intensity of impacts would increase for operations sited closer to park boundaries where water and sediment can be transported downslope into park units through streams, gullies, or overland flow. Careful siting of operations would avoid moderate or steep slopes, reducing the potential for downslope contamination with oil, gas or other hazardous substances. Other considerations for locating a production site would include avoiding close proximity to wetlands, floodplains, or waterways. Intensity of impacts on park floodplains would depend on proximity of operations to the park units; site specific environmental conditions, such as steepness and direction of slope and surface hydrology; and mitigation measures being employed.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limit, it is likely that many sites would have insufficient bonding for reclamation. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, remediation of well sites could be delayed indefinitely. Until well plugging and surface reclamation is completed, there would be loss of use and potential adverse impacts on floodplains. Because performance bond amounts rarely approach \$200,000 for seismic operations, impacts on floodplains from these operations are not generally tied to inadequate bond amounts. However, delayed reclamation would result in immediate and unnecessary adverse impacts on floodplains that could become long-term impacts.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations, impacts on floodplains could result from leaks or spills that could occur with no financial assurance to cover the cost of cleanup if there is no performance bond in place. If the new owner defaults before posting financial assurance, the NPS would need to seek and acquire funding for cleanup or reclamation. Reclamation could be delayed indefinitely. Over the interim period, the NPS would suffer loss of use, and potential adverse impacts on floodplains would continue until they were properly mitigated. These impacts would include adverse impacts on floodplains function and value as well as productivity from the potential release of hazardous or contaminating substances during drilling or production operations.

Enforcement and Penalties

Under the no-action alternative, the absence of penalties for minor acts of noncompliance would result in a continued lack of incentive for operators to comply fully with NPS operating standards. This increased the risk of unnecessary impacts to floodplains from spills, improper flood-proofing, and increased erosion.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages and any associated loss of use of floodplains that result from privileged use of federal surface estate.

Cost Recovery

Under the no-action alternative, lack of cost recovery could have an indirect adverse impact on natural resources, including floodplains, because additional money collected to support the NPS permitting, monitoring, and compliance programs could be used to enhance resource protection. Therefore, the non-recovery of costs under the no-action alternative would result in some adverse impacts on floodplains.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect floodplain resources. Management planning, such as fire management, vegetation management, ORV, and oil and gas management plans, can result in greater protection for these resources. Conversely, actions that cause disturbance of these resources would include activities such as prescribed burns, ORV use, mining, agricultural and logging activities, as well as any general development activities that include excavation, grading, or construction. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on floodplain resources in the area of analysis (including both park lands and adjacent lands) and a brief summary of the cumulative impacts of these actions on floodplains are listed in table 50.

TABLE 50. CUMULATIVE IMPACTS ON FLOODPLAINS (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Floodplains
Prescribed fires and fire management actions	Short-term and long-term adverse effects on floodplain function and values from loss of productivity following removal of vegetation that may be preventing erosion and sedimentation; short and long-term impacts from fire line construction that requires digging and displacement of soils and loss of organic matter from burning of surface litter and topsoil and altered hydrology. Long-term beneficial effects of reduced fire occurrences with managed burns that reduce the possibility of catastrophic and high intensity fire; improved productivity and erosion control from vegetative cover that is established after these treatments.
NPS facility and road construction	Short-term and long-term adverse effects on floodplain function and values from direct loss of soils and vegetation when removed for development, altered hydrology, and compaction and rutting of soils during road grading and construction using heavy equipment, improper flood-proofing, increased road runoff and crossing of small areas of tributary floodplains.

Past, Present, and Reasonably Foreseeable Activity	Impacts on Floodplains
Vegetation management	Long-term beneficial effects of erosion control from improved vegetative cover, which hold soils in place. 500-foot setbacks and restricting staging areas, access roads, and restricting placement of staging, well pads, and flowlines to areas outside of the 100-year floodplain, where practicable.
Trails development and maintenance	Short-term and long-term adverse effects on floodplain function and values from compaction and rutting during clearing, grading and surfacing of trails, and removal of vegetation in trail footprint, altered hydrology.
ORV use	Short- and long-term adverse effects on floodplain function and values from compaction and rutting, erosion and sedimentation following vehicle-related disturbances to surfaces; altered hydrology.
Abandoned mine lands reclamation	Short-term adverse effects on floodplain function and values from compaction and rutting during reclamation-related disturbances, improper flood-proofing, altered hydrology. Long-term beneficial effects of improved surface (revegetation) and reduced erosion following reestablishment of natural contours and floodplain restoration.
Mining and logging activities	Long-term adverse effects on floodplain function and values from erosion stemming from legacy surface disturbances and vegetation removal and long-term effects of acid mine drainage on floodplain function and values (degradation).
Recreational use	Short- and long-term adverse effects on floodplain function and values from visitor activities including trampling and associated compaction and rutting. Long-term beneficial effects on floodplain-dependent wildlife for enhanced viewing and aesthetics.
Ranching, agricultural land uses	Short- and long-term adverse effects from operations that remove vegetation cover, compact soils, create ruts that increase potential for erosion and alteration of hydrology.
Land development: residential and nonresidential (commercial, industrial) land uses, including road construction	Short- and long-term adverse effects on floodplain function and values from direct loss of soils and vegetation in development footprint and compaction, rutting, erosion and sedimentation following construction-related disturbances; altered hydrology. Construction may increase erosion and deposition of sediments that could alter the topography, modify surface water flows and hydrology, and indirectly adversely affect vegetation, fish, and wildlife. Excavation activities associated with construction, the installation of subsurface drainage, and extensive groundwater or surface water withdrawals for agricultural, industrial, or residential uses may disrupt surface and subsurface water flow, which could cause reductions in water levels and/or changes in frequency, duration, or extent of water distribution.
Future oil and gas development on adjacent lands	Direct effects on floodplain on adjacent property and indirect adverse impacts on floodplain soils from “spill-over effects” of sedimentation and contamination from surface runoff and improper flood-proofing; possible severe adverse impacts in the unlikely event of a well blowout, fire, or major release; trends indicate that the exploration and production of shale gas, in particular, is anticipated to increase dramatically over the next 30 years.
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term adverse effects on floodplain function and values from reclamation related disturbances due to use of equipment on site and grading. Long-term beneficial effects of restoration of natural contours and hydrology, topsoil and vegetation cover that protects soils from erosion; removal of sources of contamination and contaminated soils, floodplain restoration. Recontouring and revegetating disturbed areas should reduce soil erosion and re-establish surface drainage flows.
Recovery actions against operators that damage park resources under 54 USC 100721	Long-term beneficial effects of cleanup of areas and recovery of natural resources that have been damaged from oil and gas spills that affected park lands and resources.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 51 includes an accounting of cumulative impacts that could affect floodplains in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 51. CUMULATIVE IMPACTS ON FLOODPLAINS – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Grazing; agricultural activities; residential development; road building; irrigation; visitor activities within the park.	Loss of soils in footprints of development, soil compaction and rutting; reduced soil permeability; increased erosion; altered hydrology.
Big South Fork National River and Recreation Area	Actions include agricultural and forestry operations; commercial and residential development; road construction; existing and future coal mining operations; visitor use; prescribed fires; and plugging and reclamation of abandoned wells including 39 under an ARRA funded program.	Loss of floodplain resources in footprints of development, soil compaction and rutting; reduced soil permeability; increased erosion; altered hydrology; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, which change soil chemistry, and mine tailings resulting in contaminated sediments and soils; beneficial impacts from abandoned well plugging.
Big Thicket National Preserve	Actions include agricultural and forestry operations; urban and residential development; publicly owned facilities (water impoundments, water diversion structures, and sewage treatment); road construction; visitor use; and plugging of abandoned wells under an ARRA funded program.	Loss of floodplain in footprints of development, soil compaction and rutting; reduced soil permeability; increased erosion and sedimentation; altered hydrology; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, benefits from plugging of abandoned wells – site cleanup, grading and addition of soils and restored hydrology, revegetation of floodplains.
Cumberland Gap National Historic Park	Park developments and visitor use; establishment of nearby State Parks. Continued management of recommended wilderness in accordance with Wilderness Act and NPS policies; acquisition of Fern Lake and surrounding area.	Loss of floodplains in footprints of development; benefits include reduced rates of erosion and compaction and rutting through wilderness management and acquisition of additional floodplains resources in the park.
Cuyahoga Valley National Park	Residential, commercial, and transportation related land development and construction outside the park; ongoing park operations and maintenance. Invasive and nonnative species management inside and outside of the park; land acquisitions and easements; agricultural use.	Loss of floodplains in footprints of development, soil compaction and rutting; reduced soil permeability; increased soil erosion; agricultural runoff, such as fertilizers and oil or herbicide use from vegetation management resulting in changed soil chemistry and vegetation community; altered hydrology; benefits from acquisition of additional floodplain resources in the park.
Gauley River National Recreation Area	Urban development. Transportation infrastructure improvements; mined land reclamation.	Loss of floodplains in footprints of development, compaction and rutting; reduced soil permeability; increased erosion; altered hydrology. Beneficial cumulative impacts from mine reclamation include improvements to soil and vegetation structure and reduced rates of erosion.

Park Unit	Cumulative Actions	Description of Impacts
Lake Meredith National Recreation Area	Actions include recreational activities; ranching and agriculture; residential development; road construction; water impoundments (i.e., Lake Meredith); recreational ORV use and other visitor use.	Loss of floodplains in footprints of development, soil compaction and rutting; introduction of contaminants into floodplain soils and lake sediments from leaking fuels; reduced permeability of soils, and increased erosion and sediment accumulation in surface waters; and indirect effects to the extent of flooded or saturated soils from increases or decreases in water levels and/or alter the duration and frequency of stream flows, altered hydrology.
New River Gorge National River	Urban development. Transportation infrastructure improvements; mined land reclamation.	Loss of floodplains in footprints of development, compaction and rutting of soils; reduced soil permeability; increased erosion; altered hydrology. Beneficial impacts from mine reclamation include improvements to soil and vegetation structure and reduced rates of erosion.
Obed Wild and Scenic River	Catastrophic release.	Contamination of floodplain soils from spill – oil and fire byproducts; erosion of soils and sedimentation following fire.

Overall, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated operations would have a beneficial impact on floodplains in all category 1 and 2 park units, while exempt operations would cause adverse impacts stemming primarily from the current lack of regulation. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development occurring in the broader study area and the other cumulative actions affecting the resource in the entire study area.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in measurable impacts. Impacts on floodplains from permitted operations relating to site contamination, erosion and sedimentation, improper flood-proofing, altered hydrology and adverse effects on floodplains function and values would be as described for alternative A, no action.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations would not change the direct impacts of the footprint of well pads on floodplains; there would still be loss of floodplains function and value due to temporary vegetation removal and reestablishment of original vegetation within the footprint of previous disturbance. However, the change in regulation under alternative B would reduce indirect impacts and the risks of impacts on floodplains from oil and gas operations because of the implementation of better operating practices. Impacts from site development and operation would include soil compaction and increased soil erosion from vehicle compaction and rutting and vegetation clearing, leading to adverse impacts on floodplains function and values; and degradation from the potential release of hazardous or contaminating substances during drilling or

production operations. However, once the rule change is implemented, these operations would need to meet the least damaging standard and other operating standards that are spelled out in the regulations. The operating standards and mitigation that would now apply to previously exempt operations include removal of contaminated soils, effective erosion control, proper secondary containment around storage tanks, prohibition on earthen pits (must use containerized mud systems), leak detection and containment, required offsite disposal of drilling wastes, multiple liners on the drilling pad, and other spill prevention measures. This would result in reduced erosion, remediation of contaminated soils, and a reduction of risk of future contamination. Reclamation actions must begin as soon as possible, and no later than 6 months following completion of operations, unless a longer period of time is authorized in writing by the regional director. The proposed rules also require that operators use native soil material and grade to conform the contours to elevations that maximize hydrologic and ecologic functional value. For those operations on private lands (previously access-exempt) where there is a reasonable chance of accidents affecting floodplains on federal lands, bringing these operations within the scope of the 9B regulations will allow park managers to take a proactive approach to protecting the federal interest by ensuring that operations inside the park unit are conducted in a manner that offers the highest possible protection to a park's resources and values. The risk of impacts from spills and flooding that could reach park property would be substantially reduced by implementation of strong spill prevention, control, and countermeasure technologies.

As previously discussed, oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs including floodplains and riparian areas. The permitting of future plans of operations within these park units would be subject to these SMA setback recommendations, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Looking at site-specific information available for the nine parks with previously exempt operations, under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority, the majority of which occur in Big South Fork and Cuyahoga Valley National Park. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. As a result, beneficial effects would occur to floodplain resources through requirements to adhere to these standards and measures. Information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting park resources, including floodplains.

Bringing currently exempt oil and gas operations under the 9B regulations would result in a reduction in the severity of adverse impacts on floodplains from oil and gas operations such as soil compaction and increased soil erosion, disturbance to vegetation, and contamination from spills and leaks that may run off into nearby surface waters and groundwater, particularly at sites that are located within 500 feet of floodplain resources. The risk of impacts on these sites occurring on lands in the federal interest would be reduced through the application of improved standards for the use of least damaging technologies at sites where, presently, only the imminent threat standard or no standard applies. Also, operators would be responsible for the cleanup of released hydrocarbons, produced waters, or treatment chemicals on contaminated sites. Well sites with documented contamination are expected to be remediated more quickly as a result of new management provisions enforced under the 9B regulations. This more rapid

response to the remediation of spills at sites identified as priorities for cleanup would reduce the extent of further damage to floodplains, leading to improved site conditions under a more protective standard for operations and maintenance of sites with a documented history of contamination. Therefore, alternative B would result in long-term, direct beneficial impacts on floodplains on previously exempt operations.

Directional Drilling

With no substantive change to regulations for directional drilling under alternative B, impacts on floodplains would be the same as described under alternative A.

Financial Assurance

Impacts affecting floodplain function and value, such as spill- and leak-related changes to soil and vegetation, soil compaction, rutting and increased erosion, and altered hydrology would be remediated in a more timely manner with the enhanced financial assurance requirements under alternative B. Impacts on floodplains from seismic operations are not generally tied to inadequate bond amounts, so this provision would not have much of an impact on this specific phase of oil and gas development. However, adequate bonding for drilling and production phases would provide funds for the NPS to reclaim sites sooner in the event of an operator default. This would result in a beneficial change to impacts on floodplains compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. This would reduce the risk that the NPS would suffer unnecessary loss of use and potential adverse impacts on floodplains because reclamation may be accelerated compared to the existing condition.

Enforcement and Penalties

Under alternative B, a new penalty provision that would be established would provide incentives for an operator to comply with the 9B regulations. That would, in turn, facilitate protection of park resources and values, including floodplains resulting in a long-term indirect beneficial impact.

Compensation for Access across Federally Owned Land

Under alternative B, beneficial impacts on floodplains may result from compensation and compensatory reclamation activities that may be done in lieu of an access fee. These activities would involve restoration of disturbed areas, including legacy oil and gas sites, to natural conditions. Over the long-term, beneficial impacts on floodplains would accrue from such reclamation measures completed under alternative B, compared to the existing condition.

Cost Recovery

Under alternative B increased monitoring and evaluation of operations that could be funded by permit application fees would allow for NPS to detect potential problems such as spills and releases, and ensure operational compliance, thereby mitigating potential impacts on many resources including floodplains. Although permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to floodplains to the extent these funds were applied to increased monitoring and evaluation

of operations. As a result, under alternative B, cost recovery could have a beneficial impact on floodplain function and values compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, both adverse and beneficial cumulative impacts would occur from projects, plans and actions and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on floodplains, as described in the above analysis. Bringing previously exempt operations under regulation would add substantial beneficial impacts on floodplains. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on floodplains from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on floodplains at the site-specific level of analysis.

Directional Drilling

The regulation of directionally drilled wells under alternative C would result in both direct and indirect beneficial effects to floodplains beyond park boundaries either by application of NPS operating standards on operations located outside the unit, or by operators choosing a surface location inside the park boundary.

However, the application of regulations on surface and subsurface operations located outside of NPS boundaries may potentially remove a key incentive for operators to locate operations outside of park units. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed (O’Dell pers. comm. 2013d) (see the “Socioeconomics” section). As a result of the changes in alternative

C, operators may be more likely to select locations within park unit boundaries, thereby intensifying direct impacts on park resources, including floodplains. If surface locations are sited within the park unit boundaries, adverse effects on park floodplains would include those impacts previously described under “Typical Impacts of Oil and Gas Operations on Floodplains.” and include loss of use, soil compaction and rutting, increased erosion, altered hydrology, changes to soil and vegetation productivity, and loss of floodplains function and values related to exploration and production activities that would be associated with wells.

Therefore, alternative C could create additional long-term direct adverse impacts to floodplains within park units compared to the existing condition. However, a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, would facilitate protection of park resources and values, including floodplains, resulting in a long-term indirect beneficial impact on floodplain resources.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, there would also be effects on floodplains that would occur as a result of oil and gas operations that would continue to affect floodplains where impacts cannot be avoided, and benefits from bringing previously exempt operations under regulations and the resultant reduction in adverse impacts, as described in the alternative B analysis. Alternative C would contribute to cumulative impacts mostly by adding beneficial impacts of bringing previously exempt operations under regulation, but also by possibly adding adverse impacts from the change in directional drilling regulations that could result in more oil and gas development within park units as opposed to outside park boundaries. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on floodplains from the existing condition. Continuing impacts on floodplains from regulated and exempt operations would be expected. Impacts would be as described in the analysis, with an increased risk of more severe or extensive adverse impacts on access-exempt or grandfathered sites unless those sites changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations would result in impacts such as erosion (including off-site effects), contamination from spills and improper flood-proofing, altered hydrology, change in soil chemistry and vegetation productivity, and possible effects on floodplains function and values if not protected. As a result, there would be continuing impacts from ongoing oil and gas activities occurring within the park units. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on floodplains. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks

and contaminated soils or water leaves the site and enters floodplains resources. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including floodplains, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of impacts. Because the adverse impacts under alternative A would not result in widespread degradation of park floodplains and would be generally localized to the wellpads and mitigated by site reclamation, these impacts would not be significant.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on floodplains in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects as described above would accrue from the continued unregulated operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term indirect beneficial impacts on floodplains, compared to the existing condition. Benefits would accrue primarily from reduced risk to floodplains due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the no-action alternative. This would result in improved erosion/sedimentation control, storm water management, improved spill prevention (contamination) and countermeasure actions, as well as improvements to hydrology, soil, and vegetation productivity within the floodplain compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Overall these regulatory improvements would result in long-term indirect beneficial impacts on floodplains compared to the existing condition. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would be very limited in extent compared to the entire park area, and mitigation measures or stipulations would reduce the loss or degradation of floodplains, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations. Adverse impacts of oil and gas development would be localized, subject to regulatory review, and limited, and would not be significant.

Alternative C

Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells (operations located wholly on non-federally owned lands but still within the boundary of a park unit) not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on floodplains because NPS standards would apply inside and outside the

park. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts such as erosion, contamination from spills and improper flood-proofing, altered hydrology, and changes in soil chemistry and vegetation productivity within park boundaries, following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to floodplains within park units compared to the existing condition, although these impacts would be localized and small in number. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Because alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would be limited in extent compared to the entire park area, and mitigation measures or stipulations would reduce the loss or degradation of floodplains, the impacts of this alternative would not be significant.

Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans, and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial. Adverse impacts of oil and gas development would be localized, subject to regulatory review, and limited, and would not be significant.

VEGETATION (INCLUDING PLANT SPECIES OF SPECIAL MANAGEMENT CONCERN)

METHODOLOGY

Potential impacts on vegetation and plant species of management concern (also referred to as “special-status species”) are assessed in this section, based on the actions being proposed and characteristics of the vegetation in the park units. Resource-specific context for assessing impacts of the alternatives to vegetation and special-status plant species includes the following:

- the type and amount of disturbance (such as duration of operation and type and location of access roads and pads).
- the potential for nonnative invasive species-related impacts occurring from oil and gas activities.
- the susceptibility of vegetation including special-status species to disturbance, removal, contamination, or other effects of oil and gas activities.
- the presence of special-status species in park units and their potential to be present in areas of oil and gas development.

For the programmatic level analysis, a qualitative analysis of the potential impacts of oil and gas operations on the species was conducted based on actual experience of the NPS in management of non-federal oil and gas operations, professional judgment, and information available in the literature. Impacts on special-status plant species are addressed in a subsection following the discussion of impacts on vegetation in general. Data obtained from park natural resource contacts, oil and gas management plans, and the NPS Integrated Resource Management Applications web portal database were used to derive lists of special-status species that are likely to be found in the parks and their likely occurrence at exempt well sites based on available vegetation cover type data and habitat preference. This information for plants and animals is found in appendices E, F, and G. Site-specific analysis includes an assessment of the susceptibility of the sites to contamination and other disturbances that can affect vegetation and special-status species.

IMPACTS OF ALTERNATIVE A: NO ACTION

Typical Impacts of Oil and Gas Operations on Vegetation

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on vegetation can result from localized clearing and trimming for surveying and increased vehicular traffic associated with seismic investigations. The introduction or spread of nonnative invasive vegetation could occur as a result of vehicular traffic, but this would be relatively limited in extent during this phase. Surface disturbance from survey crews traversing the area during geophysical exploration could also cause localized soil compaction. Compaction reduces the soil's water-holding and infiltration capacities which could increase runoff of surface waters and accelerate soil erosion (Duiker 2004; Penn State 2009). Erosion and loss of soil could ultimately degrade existing plant communities. The majority of impacts associated with geophysical surveys are limited in extent and severity, because of the temporary nature of the disturbance and localized area disturbed by survey crews.

Impacts of Well Drilling and Production

Vegetation removal and ground disturbance associated with the construction and installation of well pads, pipelines, access roads, and other facilities would affect vegetation both directly and indirectly. Direct effects would include removal of vegetation by clearing, grading, cutting, filling, and leveling of the site using heavy construction equipment during site preparation. This activity may also modify habitat structure, species composition, and the extent of vegetation cover types. Site clearing to accommodate a well drilling rig and associated equipment would remove about 1.5 to 4 acres of vegetation for each well pad, resulting in a permanent conversion of the vegetation cover type to an industrial use. The degree of impact would depend on the type and amount of vegetation affected, the rate at which the vegetation would regenerate after construction, and the frequency of vegetation maintenance conducted during operation.

During drilling and production, the construction, maintenance, and use of access roads, well pads, flowlines, and pipelines could directly impact vegetation and plant root system integrity by removal or crushing of plants. Indirect effects associated with disturbances to vegetation could include increased soil erosion and compaction (see "Geology and Soils" section). Increased erosion rates and reduction in soil stability and productivity could prevent successful reclamation with native species and composition. Surface disturbances could cause soil compaction, thereby reducing the soil's water-holding and infiltration capacities. This, in turn, would reduce the root penetration capabilities of vegetation and hinder plant growth and further soil formation (Crush and Thom 2011). Vegetation established at the edges of well pads could also experience "edge effect" such as changes in microclimate (e.g., sunscald or scorch) in the adjacent open areas and potential changes in herbivory (Adams et al. 2011).

In addition to construction-related impacts associated with development of access roads and well pads, there is a risk of impact on vegetation from releases of hazardous or contaminating substances during drilling or production operations, including well workovers and servicing. The presence of oils and other well development chemicals in soils and site runoff could kill vegetation or adversely impact overall plant health.

Contamination from the release of produced waters containing salts and other well drilling fluids could also impact vegetation in the park units. These substances may contain relatively large concentrations of dissolved salts, particularly sodium chloride, and can have salt concentrations greater than ocean water.

Salt stress is the major environmental factor that affects all vital plant processes such as growth, photosynthesis, protein synthesis, energy and lipid metabolism, and productivity (Parida and Das 2005).

Accidental release of produced waters would likely damage or kill vegetation in the immediate area and possibly adjacent areas. Immediate adverse impacts on vegetation could occur through direct contact of foliage with the released material. Long-term, systemic impacts could also occur through uptake of the material from the soil by plant roots, thereby reducing the species' ability to recover and reestablish (Adams et al. 2011). Instances of leaks from salt-water disposal wells and subsequent contamination occurring as the result of mechanical problems and improper operating practices have been documented at Big Thicket National Preserve (NPS 2013).

Ground disturbance and removal of existing vegetation could also promote the introduction of nonnative plant species. Invasive species actively outcompete and replace native species and are a threat to the overall ecological health of the park units. Introduction of invasive plant species through seeds or other propagules may increase due to greater vehicular traffic for well site construction and maintenance, improper erosion control and restoration methods, and through other ground disturbing/clearing activities that would disturb fallow seed (weed) banks. Such introductions could negatively affect native plant communities, reduce diversity, reduce forest health and productivity, and degrade native wildlife habitat (Vila 2011; Tylianakis 2008). Such vegetation is present in every NPS park and various management efforts are ongoing to deal with the establishment and spread of invasive species.

The types of impacts related to vegetation for directionally drilled wells are expected to be similar to those described for operations inside the park units; however, direct impacts to vegetation in the parks would not occur. The risk of indirect impacts and their intensity would vary with the location of the well with respect to the park boundary and direction of surface runoff. The risk of impacts on park resources would be greater for directionally drilled operations sited closer to park boundaries with surface gradients toward the park, where water and sediment can be transported downslope into park units through adjacent streams, gullies, or overland flow. Severity of impacts would depend on proximity of operations to the park units; type of construction, site-specific environmental conditions, such as steepness and direction of slope and surface hydrology; the presence of hazardous substances in the runoff, sensitivity of resources, and mitigation measures being employed.

Impacts of Plugging and Reclamation

When drilling and production operations end, well plugging and surface reclamation results in overall beneficial impacts on vegetation. Although damage and loss of vegetation during ground disturbing equipment occurs from plugging actions, these disturbances are temporary and occur in previously disturbed areas. Accidental spread and establishment of exotic species in the project area during well plugging and surface reclamation would be minimized through monitoring and best management practices. There are also beneficial effects on vegetation once cleanup is successfully completed and the site is reclaimed to natural conditions and processes. Reclamation involves returning the topography of a site to approximate the original contours, and reestablishing natural vegetation communities. Allowing vegetation in disturbed areas to recover provides erosion control in areas of previous impacts from oil and gas operations. Sources of potential leakage such as wellhead equipment and flowlines are also removed during plugging and reclamation. Beneficial impacts of plugging and reclamation are realized in the short term and over the long term.

Recovery of vegetation communities would be primarily dependent on location, soil conditions, precipitation, and type of community desired. Except for rare vegetation communities that are susceptible to the adverse impacts of oil and gas operations, most vegetation communities in the park units would be expected to reestablish in a relatively short time. If access roads are not reclaimed, but continue to be used

for other administrative purposes, adverse impacts on vegetation could occur if visitors travel off established routes.

Typical Impacts of Oil and Gas Operations on Special-status Plant Species

The NPS parks addressed in this EIS provide habitat that supports many species of plants that are threatened, endangered, or of special concern at the national, regional, and local level. The NPS *Management Policies 2006*, section 4.4.2.3 states that the NPS will manage state and locally listed species within park units in a manner similar to its treatment of federally listed species to the greatest extent possible. The conservation of special-status plants and their habitats, as well as natural communities, is integral to maintaining biological diversity.

Some of these species and their habitats may occur in areas suitable for oil and gas development. Given the programmatic nature of this analysis, the exact locations of future operations are unknown, and site specific data for presence or absence of special-status species at existing wells may not be available. Wells with current permits would have gone through a review for the presence of special-status species at the time of permitting.

Impacts on special-status plants from oil and gas operations can occur during geophysical exploration, drilling and production, or reclamation phases of development. Impacts such as damage and loss of vegetation resulting in modification of the existing plant community structure and composition in the project area, soil compaction and rutting, reduced soil permeability and root integrity, increased erosion and reduced vegetation health and productivity, and potential contamination of soils and vegetation from leaks and spills could occur as a result of oil and gas operations.

As noted in the following analysis, impacts to special-status plants are usually avoided or mitigated through consultation with the U.S. Fish and Wildlife Service (USFWS) (or similar state agency), use of project area surveys, and completion of biological assessments where adverse impacts could occur.

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on special-status plant communities would be similar in nature to those of common vegetation communities. Localized vegetation clearing and trimming for surveying and increased vehicular traffic associated with seismic investigations could lead to injury or destruction of sensitive plant species and habitat where exploration operations are permitted. These operations would be required to avoid impacting species of special concern and their habitat, which would be identified through consulting park biologists or biological surveys, if determined necessary by the NPS through consultation with federal or state agency biologists. When species of special concern and their habitat are found to be within the project area, application of mitigation measures, including sufficient setbacks and/or timing restrictions for sensitive periods in a given species' life cycle, would likely result in avoiding or minimizing potential adverse effects.

Surface disturbance from survey crews traversing the area during geophysical exploration could introduce or spread nonnative invasive vegetation, but this would be relatively limited in extent during this phase. Surface disturbance could also cause localized soil compaction and dust emissions which would ultimately degrade existing sensitive plant communities. Upon the completion of operations, reclamation of disturbed areas would be required, and recovery of any vegetation disturbed is expected to occur over the short term. The majority of impacts associated with geophysical exploration are limited in extent and minor, because of the temporary nature of the disturbance and localized area disturbed by survey crews.

Impacts of Well Drilling and Production

Drilling and production operations would not likely directly impact species of special concern or their habitat in areas afforded protection under current regulations, including the ESA and 9B regulations. However, operations could result in indirect impacts on special-status plant species, primarily from the disturbance related to construction of new well pads, access roads, flowlines, and pipelines. Impacts would be similar in nature to those of common vegetation communities including loss of vegetation and habitat, surface disturbances leading to soil compaction, erosion and sedimentation, and nonnative species introduction. If vegetation clearing is unavoidable, it would be limited in extent and mitigation would require that least damaging methods are used for site preparation. In sensitive plant communities, a large effort would be made during planning and operation to avoid or minimize alteration of the surface area more than necessary.

Releases of hazardous or contaminating substances and any maintenance activities that are needed pose the greatest threat to special-status plant species. Potential source and nonpoint source pollution from releases and runoff could kill plants or impact the overall health and survival of affected special-status species.

Drilling and production operations could range in duration from short term (weeks or months for well drilling and construction of roads, well pads, flowlines, and pipelines) to long term (lasting 20 years or more for road, flowline, pipeline, well, and production operations). Construction and maintenance of roads, pads, flowlines, and pipelines could require vegetation clearing and could result in loss of special-status plants if these are not identified.

Potential effects on special-status plant species would depend on where drilling and production operations are located within the units. Careful siting of developments based on biological survey and/or assessment results could avoid or minimize these impacts substantially. Through the required biological surveys and/or assessments and consultations with USFWS and other state agency biologists, potential impacts on special-status species and their habitat would be identified, and the application of appropriate mitigation measures would reduce or eliminate adverse impacts.

Impacts of Plugging and Reclamation

Well plugging, removing flowlines and pipelines, and use of heavy equipment and vehicles to reclaim sites could have the potential for releases of oil and other contaminating and hazardous substances, which could harm or kill protected plants. However, ongoing consultation under the ESA; performing biological surveys of the area that could be potentially impacted by proposed plugging, abandonment, and reclamation operations; identifying listed species; and applying appropriate mitigation would result in reduction or elimination of adverse impacts on listed species.

Plugging and reclamation would require clearing vegetation at the well and access roads, which may temporarily affect nearby sensitive vegetation communities. However, reclamation would result in overall beneficial impacts on sensitive vegetation similar to those of common vegetation communities. With minimal use of equipment used to clear well pads and access roads and revegetation of the area with weed-free native seed mix, the area affected would be small. Access roads that have been developed or allowed to remain open for the primary purpose of allowing access for oil and gas operations would be reclaimed at the completion of operations, returning the area to its natural conditions. Wherever possible, habitats would be improved to perpetuate the viability of the plant communities and habitats and increase the survivability of nearby special-status species. The outcome of these activities, in returning natural conditions to the operations area, would have long-term beneficial impacts.

If restored properly, few effects on sensitive plant community size, integrity, or continuity would be anticipated and impacts would not affect the overall viability of these plant communities. Avoiding areas of known sensitive species and timing of reclamation to avoid conflicts with critical growth periods would reduce impacts on special-status vegetation and encourage restoration success during this phase. Monitoring site recovery and success would be determined by measuring species survival, native vegetation density and diversity, percent cover, etc. Allowing sensitive vegetation in disturbed areas to recover also provides erosion control in areas of previous impacts from oil and gas operations.

Regulated Operations (Current and Future)

Impacts on vegetation and special-status plants species that would occur from ongoing or future permitted oil and gas production operations include those described above under “Typical Impacts of Oil and Gas Operations on Vegetation” and “Typical Impacts of Oil and Gas Operations on Special-status Plant Species.” Within the footprint of the disturbance, potential impacts during drilling and production include damages to and loss of vegetation and habitat where site grading and facility construction occurs, soil erosion and sedimentation associated with disturbed areas; introduction of nonnative species, and possible contamination from leaks and spills, leading to adverse impacts on plant health and productivity.

Current data indicate that there are 215 wells under plans of operation in the category 1 park units. Direct surface disturbances from well pads range, on average, from 0.1 to 1 acre for non-directionally drilled operations, with the average area of road disturbance ranging from 0.4 to 1.2 acres per operation.

Current permitted operations are adversely affecting approximately 305 acres of vegetation. The historic average of new drilling operations is about 4 proposals per year (NPS 2013). Therefore, approximately 6 additional acres per year could be impacted from future well development assuming those operations are not access exempt.

Regulated operations are subject to the 9B regulations, which require that operating standards be met. Current operating standards specifically within the regulations include precautions for well control, proper handling of wastes, site security, siting restrictions, and conduct of operations in a “safe and workmanlike manner” (see current 9B regulations, 36 CFR 9.41 – 9.46). Additional resource-specific standards and recommended actions to achieve them are included in the NPS Operators Handbook (NPS 2006b). In addition, under the current approval process for plans of operation, the NPS works with operators to identify the relevant resource and visitor value issues and operating standards on a site-specific basis, which leads to the appropriate mitigation measures being incorporated into an approved plan of operations.

Typical mitigation measures that minimize impacts on vegetation include removal of contaminated soils, effective erosion control, management of native and exotic plant species, identifying and minimizing disturbance to sensitive plant communities, and removal of debris, waste, and equipment no longer needed in operations. Long-term adverse effects could also be minimized by using already disturbed areas (including existing pads) for well pad sites and using existing access roads. The use of primary and secondary containment on a well pad is an additional practice which prevents the release of drilling muds, diesel fuel, oil and gas, and other substances beyond the well pad.

Special-status species are protected under ESA regulations by requirements for oil and gas operations to avoid impacting species of special management concern and their habitat, which is identified through consultation with park biologists. Under the 9B regulations, the operator is required to conduct a pre-operational analysis to adequately describe the natural, social, and economic environments that would be affected by the operations. These surveys may include vegetation and threatened and endangered species (36 CFR 9.36(a)(16)(i)).

Biological surveys may also be warranted if, through consultation with federal or state agency biologists, the NPS deems them necessary. When plant species of special concern are found to be within the project area, application of mitigation measures, including sufficient setbacks or possibly salvaging and replanting, would result in avoiding or minimizing potential adverse effects. If vegetation clearing is unavoidable, mitigation measures would require that it be limited in extent and that least damaging methods are used for site preparation.

Based on available information and habitat preferences of species on or near the exempt well locations, only four park units are likely to support three special-status plant species. One well site within Big Thicket National Preserve may contain preferred habitat for the federally endangered Texan trailing phlox. Big South Fork National River and Recreation Area and Obed Wild and Scenic River may contain preferred habitat for the federally threatened Virginia spiraea at 50 well sites. Gauley River National Recreation Area may likely support Virginia spiraea at seven well sites as well as the endangered running buffalo clover at seven well sites. Sensitive plant communities at the four park units would benefit from setbacks and avoidance measures. Texan trailing phlox prefers deep, sandy soils in open pine woodlands. Habitat loss and degradation due to site preparation and land clearing for well sites, exposure to herbicides, and activities associated with development may contribute to the decline of this species. Virginia spiraea and running buffalo clover prefer more mesic woodlands where impacts could occur if located near a well site associated with road maintenance and off-road vehicle use disturbances, nonnative plant species, chemical spills, and pollution.

For these sensitive plant communities, a large effort would be made during planning and operation to avoid or minimize alteration of the surface area more than necessary. Biological surveys may need to be completed at the well locations to assess the presence of federal or state listed plant species, and appropriate mitigation taken to protect any species that are being adversely affected. Careful siting of developments based on these biological survey and/or assessment results could avoid or minimize adverse impacts substantially. Through the required biological surveys and/or assessments and consultations with USFWS and other state agency biologists, potential impacts on special-status species and their habitat would be identified, and the application of appropriate mitigation measures would result in an elimination or reduction of adverse impacts.

Overall, the implementation of these measures would reduce the extent or intensity of impacts on vegetation and special-status plant species during drilling and production.

Impacts on vegetation from currently regulated and future operations also include the effects of geophysical (seismic) surveys that are conducted within the category 1 park units and may be conducted in category 2 park units. Since 1998, 20 seismic surveys have been conducted in 6 parks for an average of 1.4 surveys per year. All but one have been 3-dimensional seismic surveys covering large geographic areas. Going forward, the level of seismic activity is expected to taper off to about one proposed survey per year (NPS 2013). Impacts of these surveys include those described above under “Typical Impacts of Oil and Gas Operations on Vegetation” and “Typical Impacts of Oil and Gas Operations on Special-status Plant Species.” The exact extent of the surveys varies from operation to operation. However, under the current regulations, operations would need to meet the least damaging standard so vegetation disturbance and removal would be avoided or minimized. Vegetation would be cleared in accordance with current vegetation management plans or policies and effective erosion and sedimentation control would be employed. Seasonal timing, trip limits, and use of existing roads and trails to the maximum extent feasible may also minimize impacts on vegetation. Measures would also be taken to reduce the introduction of nonnative plant species from equipment and vehicles entering the project area. Accumulation of oil and other waste materials deemed to be fire and environmental hazards would be cleaned up and disposed of properly.

Oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, including some that were designated to protect vegetation. For example, “No Surface Use” stipulations and a 100-foot setback for drilling and production would be established for areas contained within the “Managed Fields SMA” at Big South Fork National River and Recreation Area under the oil and gas management plan framework unless other mitigation that protects SMA resources and values is included and authorized in an approved plan of operations. Additionally, drilling would only be allowed during dry periods (NPS 2012b). Under the Big Thicket National Preserve oil and gas management plan, the “Rare Vegetation Communities SMA” includes four forest types, and the “Ecological Research and Monitoring Plots SMA” includes fire monitoring plots and long-term monitoring plots (NPS 2005). A 150 foot offset is stipulated for surface use near both the fire and long-term monitoring plots. Under the oil and gas management plan for Lake Meredith National Recreation Area, non-federal oil and gas operations, may be permitted only with certain operating stipulations in the “Rare or Imperiled Plant Communities SMA,” which includes blue grama-buffalograss, cottonwood-tallgrass, and sideoats grama (NPS 2002b). At Padre Island National Seashore, the oil and gas management plan identifies the relict live oak mottes and the foredunes as sensitive resource areas totaling 3,240 acres to be closed to surface access associated with non-federal oil and gas operations (NPS 2000b). The permitting of future plans of operations within these park units would be subject to SMA setback recommendations or other restrictions, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Upon the completion of operations, reclamation of disturbed areas would be required, and recovery of any vegetation disturbed is expected to occur over the short term. Sites that are located in higher elevation or more arid ecoregion provinces such as Carlsbad Caverns, Guadalupe Mountains, and Mesa Verde National Park, however, may require more time for reestablishment and restoration of vegetation compared to more coastal or temperate sites.

When current operations end and wells are plugged and sites are reclaimed, impacts on vegetation would be as described under “Typical Impacts of Oil and Gas Operations on Vegetation” and “Typical Impacts of Oil and Gas Operations on Special-status Plant Species.” Provisions in the current regulations and approval process for well plugging ensure that sites are reclaimed properly and benefits are realized. Meeting the NPS requirement of leaving the site in a clean and safe condition in preparation for surface reclamation often involves disposing of waste materials outside of the park, employing erosion control measures on the access road and well site, and restoring site to natural contours. Proper well plugging and surface reclamation would result in stabilization of the disturbed site through the control of nonnative species and reestablishment of native vegetation community. Restoration of native vegetation communities associated with plugging and reclamation would ultimately have long-term beneficial impacts.

For production operations, the NPS has found that plugging and reclamation of old wells has essentially offset drilling and production of new wells. In the category 1 park units, 215 well sites that are under permit would eventually be reclaimed, representing 305 acres of vegetation that would be restored. Current projections are that about 4 existing wells per year would be plugged and reclaimed (NPS 2013).

Currently Exempt Operations

Under the no-action alternative, existing and future “access-exempt” operations and existing grandfathered operations would also result in impacts on vegetation, and these impacts are often more extensive or more severe compared to impacts that occur from regulated operations, because exempt

operations are not subject to NPS operating standards and mitigation measures that would serve to remove or reduce impacts.

The following discussion provides more site-specific detail of the current and potential impacts on vegetation from activities associated with these currently exempt operations. Currently there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. Impacts on vegetation that would occur from ongoing exempt operations include those described above under “Typical Impacts of Oil and Gas Operations on Vegetation.” However, because these operations are not fully regulated, there is a higher level of risk of impacts on vegetation from surface disturbances, continuous but minor leaks, lack of erosion and sediment control measures, or locations close to sensitive resources. For exempt operations, it is unlikely that surveys for special-status species were conducted, because consultation was not required under ESA since no federal permit triggered an ESA review during the development of the operation, and many state oil and gas rules do not address endangered or threatened species or may be lacking in that area of protection.

Similar to regulated operations, the primary effects on vegetation from exempt oil and gas operations stem from the fact that vegetation is removed or disturbed in the footprint of the well pad. There is also increased potential for the introduction and establishment of nonnative invasive species in the project area due to greater vehicular traffic for well site construction and maintenance, improper erosion control and restoration methods, and through other ground disturbing/clearing activities that would disturb fallow seed (weed) banks. Such introductions could negatively affect native plant communities, reduce diversity, reduce forest health and productivity, and degrade native wildlife habitat (Vila 2011; Tylianakis 2008). For grandfathered operations, based on the number of wells that have been developed in all of the category 1 park units, vegetation would be disturbed or removed on approximately 326 acres, resulting in long-term impacts that would last until reclamation is complete. The average area of access road-related disturbance ranges from 0.4 to 1.2 acres per operation. The amount of vegetation on these access roads that would continue to be adversely affected would vary, depending on road length and the need for access.

Estimates of the likelihood of special-status species occurring within these parks were made based on review of site-specific vegetation cover type information available from the NPS database (appendix G). As stated previously, only four park units are likely to support three special-status plant species. One well site within Big Thicket National Preserve may contain preferred habitat for the federally endangered Texan trailing phlox. Big South Fork National River and Recreation Area and Obed Wild and Scenic River may contain preferred habitat for the federally threatened Virginia spiraea at 50 well sites. Gauley River National Recreation Area may likely support Virginia spiraea at seven well sites as well as the endangered running buffalo clover at 7 well sites.

Impacts on special-status plants from oil and gas operations can occur during all phases of development. Impacts such as damage and loss of vegetation resulting in modification of the existing plant community structure and composition in the project area, soil compaction and rutting, reduced soil permeability and root integrity, increased erosion and reduced vegetation health and productivity, and potential contamination of soils and vegetation from leaks and spills could occur as a result of oil and gas operations.

Sensitive plant communities at the four park units would benefit from setbacks and avoidance measures. Texan trailing phlox prefers deep, sandy soils in open pine woodlands. Habitat loss and degradation due to maintenance activities for well sites, exposure to herbicides, and other activities associated with well operations may contribute to the decline of this species. Virginia spiraea and running buffalo clover prefer more mesic woodlands where impacts could occur if located near a well site associated with road

maintenance and off-road vehicle use disturbances, nonnative plant species, chemical spills, and pollution.

Exempt operations have the potential for continuing adverse impacts from exposure to and disposal of waste and hazardous substances and lack of a spill prevention plan to reduce impacts on vegetation. NPS inventory data has documented many instances of soil contamination and erosion on grandfathered sites that do not rise to the level of warranting suspension. Poor operating practices at these sites sometimes lead to spills, leaks and other releases of oils, produced water, or other chemicals that can contaminate soils, which results in the death of vegetation or effects on growth and survivability. Releases of oils or chemicals have contaminated soils and have not been cleaned up because of lack of regulation and associated oversight. Also, the use of pits instead of containerized mud systems has resulted in contamination of soils from drilling muds. Adverse impacts on vegetation resulting from instances of site contamination at exempt wells can occur through decreases in soil quality, both on private property and on nearby park property if contamination spreads off site. Erosion of soils has also occurred at these sites because erosion control measures may not be adequate on the site or access roads, but does not rise to the level of an imminent threat of significant injury. Under the no-action alternative, issues of contamination occurring at sites of exempt operations are expected to continue or to be cleaned up at the discretion of the operator, resulting in continued potential for long-term adverse impacts on vegetation if the contamination is not remediated in a timely manner. For access-exempt operations, impacts on vegetation would be indirect because they would occur on non-federal lands.

Site-specific inspection report data reveal 55 instances of currently exempt operations that have been documented as having some form of contamination occurring on site at Big South Fork and Cuyahoga Valley, including leaks from well heads, tank batteries, and pump jacks, and spills (see the “Geology and Soils” section for more detail). Several of the reports included information on the size of the contaminated areas, which at Big South Fork ranged from less than 10 square feet for 6 of the wells, to up to 2,000 square feet at one site and “the entire wellpad” for another. The NPS has identified operating conditions at access-exempt sites that could potentially impact special-status species discussed above. Appendix D presents further information regarding the instances of known site contamination for each park unit with exempt operations.

In addition to removal of soil and vegetation from production and contamination, exempt operations also have impacts on vegetation due to soil erosion. Erosion and sedimentation control measures may not be present or used by operators that do not need to follow 9B regulatory standards and are not subject to standards (access-exempt operations) or are subject only to a standard of not being an imminent threat (grandfathered operations). As discussed in the “Geology and Soils” topic in this EIS, the majority of the soils in the category 1 park units (92 percent) have a moderate to high erosion potential. Of all soil types present in the vicinity of exempt operations, soils with the most potential to be eroded are found within Lake Meredith National Recreation Area, Big Thicket National Preserve, and Cuyahoga Valley National Park.

In addition to erosion potential, site-specific information regarding proximity of exempt operations to sensitive geologic features is discussed in the “Geology and Soils” topic (table 37). Some of these features are particularly vulnerable to disturbances from oil and gas operations because they provide special habitat for certain plant and animal species, including some rare or unusual vegetation. Sensitive geologic features that may include rare species such as Cumberland sandwort, and are present within a 500-foot distance of exempt wells include the cliff edges and rock shelters at Big South Fork National River and Recreation Area.

Directional Drilling

Under the no-action alternative, the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units avoids direct impacts on vegetation and special-status plants occurring within the park unit. However, wells directionally drilled and produced from outside park units to bottomholes beneath the park units would directly impact vegetation on adjacent lands as well as presenting a risk of indirect impacts within the park units. Under the 9B regulations, the NPS cannot require preventative mitigation measures even if the operations may indirectly affect park resources by their proximity to park boundaries. As described under “Geology and Soils,” impacts could occur from soil erosion and runoff or contaminant release that reaches park vegetation, and the risk and intensity of impacts would increase for operations sited closer to park boundaries where runoff or contaminants can be transported downslope into park units through streams, gullies, or overland flow. Intensity of impacts on park vegetation would depend on proximity of operations to the park units; site specific environmental conditions, such as steepness and direction of slope, surface hydrology and vegetated surface; and mitigation measures being employed. Reclamation of the well pads and access roads of well sites drilled from outside the park units would benefit vegetation.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limits, it is likely that many sites would have insufficient bonding for reclamation. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, remediation of well sites could be delayed indefinitely. Until well plugging and surface reclamation is completed, there would be loss of use and potential adverse impacts on vegetation. Because performance bond amounts rarely approach \$200,000 for seismic operations, impacts on vegetation from these operations are not generally tied to inadequate bond amounts. However, delayed reclamation would result in immediate and unnecessary adverse impacts on vegetation that could become long-term impacts.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations, impacts on vegetation could result from leaks or spills that could occur with no financial assurance to cover the cost of cleanup if there is no performance bond in place. If the new owner defaults before posting financial assurance, the NPS would need to seek and acquire funding for cleanup or reclamation. Reclamation could be delayed indefinitely. Over the interim period, the NPS would suffer loss of use, and potential adverse impacts on vegetation would continue until they were properly mitigated. These impacts would include adverse impacts on plant health and productivity from the potential release of hazardous or contaminating substances during drilling or production operations.

Enforcement and Penalties

Under the no-action alternative, the absence of penalties for minor acts of noncompliance would result in the continued lack of incentive for operators to comply fully with NPS operating standards. This increases the risk of unnecessary impacts to vegetation from spills and increased erosion.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages and any associated loss of vegetation that result from privileged use of federal surface estate.

Cost Recovery

Under the no-action alternative, lack of cost recovery could have an indirect adverse impact on natural resources, including vegetation, because additional money collected to support the NPS permitting, monitoring, and compliance programs could be used to enhance resource protection. Therefore, the non-recovery of costs under the no-action alternative would result in adverse impacts on vegetation.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect vegetation in park units. Management planning, such as fire management, vegetation management, ORV, and oil and gas management plans, can result in greater protection for these resources. Conversely, actions that cause disturbance of these resources would include activities such as prescribed burns, recreation and ORV use, water use, mining, agricultural and logging activities, and grazing, as well as any general development activities that include excavation, grading, or construction. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on vegetation resources in the area of analysis (including both park lands and adjacent lands) and a brief summary of the cumulative impacts of these actions on vegetation are listed in table 52. It is recognized that many of these actions would involve reviews for protected special-status species, but many would occur off park lands and without any federal permit requirement and would also have the potential for effects on listed species as well as regular vegetation.

TABLE 52. CUMULATIVE IMPACTS ON VEGETATION (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Vegetation
Prescribed fires and fire management actions	<p>Short-term and long-term adverse effects on vegetation from loss of productivity following removal of vegetation; short and long-term impacts from fire line construction that requires digging and displacement of vegetation matter.</p> <p>Long-term beneficial effects of reduced fire occurrences with managed burns that reduce the possibility of catastrophic and high intensity fire; improved productivity and erosion control from vegetative cover that is established after these treatments.</p>
NPS facility and road construction	<p>Short-term and long-term adverse effects on vegetation from direct loss or damage to vegetation when removed for development and compaction of soils and damage to vegetation during road grading and construction using heavy equipment.</p> <p>Short-term to long-term adverse impacts from the loss of vegetation and ground disturbance/soil erosion and compaction.</p>
Vegetation management	<p>Short-term adverse impacts due to vegetation clearing and effects on soils.</p> <p>Long-term beneficial effects of erosion control from improved vegetative cover.</p> <p>Short term adverse impacts with long-term beneficial effects from site reclamation.</p> <p>Long-term beneficial effects of controlling the introduction and spread of nonnative invasive plant species.</p>
Trails development and maintenance	<p>Short-term and long-term adverse effects on vegetation from clearing, grading and surfacing of trails, removal of vegetation in trail footprint for maintenance, and potential introduction of nonnative plant species.</p>
ORV use	<p>Short- and long-term adverse effects on vegetation from compaction and vehicle-related disturbances to the plant communities.</p>

Past, Present, and Reasonably Foreseeable Activity	Impacts on Vegetation
Abandoned mine lands reclamation	Short-term adverse effects on vegetation during reclamation-related disturbances. Long-term beneficial effects of improved surface (revegetation) and reduced erosion following reestablishment of vegetation cover and natural contours.
Mining and logging activities	Long-term adverse effects on soils from erosion stemming from legacy surface disturbances and vegetation removal and long-term effects of acid mine drainage on vegetation (change in health and productivity).
Recreational use	Short- and long-term adverse effects on vegetation from visitor activities including trampling and associated compaction, possible introduction of nonnative plant species.
Ranching, agricultural land uses	Short- and long-term adverse effects from operations that remove vegetation cover, compact soils, grazing pressure.
Land development: residential and nonresidential (commercial, industrial) land uses, including road construction	Short- and long-term adverse effects on vegetation from direct loss in development footprint and compaction, erosion and sedimentation. Benefit from reestablishment of vegetation following construction-related disturbances.
Future oil and gas development on adjacent lands	Direct effects on vegetation on adjacent property and indirect adverse impacts on park vegetation from “spill-over effects” of erosion, sedimentation, and contamination from surface runoff; trends indicate that the exploration and production of shale gas, in particular, is anticipated to increase dramatically over the next 30 years.
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term adverse effects on vegetation from reclamation related disturbances due to use of equipment on site and grading. Long-term beneficial effects of restoration of natural contours, topsoil and vegetation cover that protects soils from erosion; removal of sources of contamination and contaminated soils to reduce impact on vegetation.
Recovery actions against operators that damage park resources under 54 USC 100721	Long-term beneficial effects of cleanup of areas and recovery of natural resources that have been damaged from oil and gas spills that affected park lands and resources.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 53 includes an accounting of cumulative impacts that could affect vegetation in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 53. CUMULATIVE IMPACTS ON VEGETATION – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Grazing; agricultural activities; residential development; road building; irrigation; visitor activities within the park.	Damage and loss of vegetation in footprints of development would temporarily modify the existing plant community structure and composition in the project area, soil compaction and rutting; reduced soil permeability and root integrity; increased erosion and reduced vegetation health and productivity.

Vegetation (Including Plant Species of Special Management Concern)

Park Unit	Cumulative Actions	Description of Impacts
Big South Fork National River and Recreation Area	Actions include agricultural and forestry operations; commercial and residential development; road construction; existing and future coal mining operations; visitor use; prescribed fires; and plugging and reclamation of abandoned wells including 39 under an ARRA funded program.	Damage and loss of vegetation in footprints of development would temporarily modify the existing plant community structure and composition in the project area; soil compaction and rutting; reduced soil permeability and root integrity; increased erosion; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, which change soil chemistry and ultimately vegetation health and productivity, and mine tailings resulting in contaminated soils; beneficial impacts from abandoned well plugging.
Big Thicket National Preserve	Actions include agricultural and forestry operations; urban and residential development; publicly owned facilities (water impoundments, water diversion structures, and sewage treatment); road construction; visitor use; and plugging of abandoned wells under an ARRA funded program.	Damage and loss of vegetation in footprints of development would temporarily modify the existing plant community structure and composition in the project area, soil compaction and rutting; reduced soil and root integrity; increased erosion; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, which change soil chemistry and ultimately vegetation health and productivity; benefits from plugging of abandoned wells – site cleanup, grading and addition of soils, and revegetation/reclamation.
Cumberland Gap National Historic Park	Park developments and visitor use; establishment of nearby State Parks; continued management of recommended wilderness in accordance with Wilderness Act and NPS policies; acquisition of Fern Lake and surrounding area.	Damage and loss of vegetation in footprints of development would temporarily modify the existing plant community structure and composition in the project area; benefits include reduced rates of erosion, compaction and surface disturbance through wilderness management and acquisition of additional vegetation resources in the park.
Cuyahoga Valley National Park	Residential, commercial, and transportation related land development and construction outside the park; ongoing park operations and maintenance. Invasive and nonnative species management inside and outside of the park; land acquisitions and easements; deer management; agricultural use.	Damage and loss of vegetation in footprints of development would temporarily modify the existing plant community structure and composition in the project area, soil compaction and rutting; reduced soil permeability and root integrity; increased erosion and reduced vegetation health and productivity; agricultural runoff, such as fertilizers and oil or herbicide use from vegetation management resulting in changed soil chemistry and plant health; introduction and spread of nonnative species.
Gauley River National Recreation Area	Urban development. Transportation infrastructure improvements; mined land reclamation.	Damage and loss of vegetation in footprints of development would temporarily modify the existing plant community structure and composition in the project area, soil compaction and rutting; reduced soil permeability and root integrity; increased erosion and reduced vegetation health and productivity. Beneficial cumulative impacts from mine reclamation include improvements to vegetation through erosion control and revegetation.
Lake Meredith National Recreation Area	Actions include recreational activities; ranching and agriculture; residential development; road construction; water impoundments (i.e., Lake Meredith); recreational ORV use and other visitor use.	Damage and loss of vegetation in footprints of development would temporarily modify the existing plant community structure and composition in the project area, soil compaction and rutting; introduction of contaminants into soils and vegetation from leaking fuels; reduced permeability of soils and reduced vegetation health and productivity, and increased erosion and sediment accumulation in surface waters and vegetation.

Park Unit	Cumulative Actions	Description of Impacts
New River Gorge National River	Urban development. Transportation infrastructure improvements; mined land reclamation.	Damage and loss of vegetation in footprints of development would temporarily modify the existing plant community structure and composition in the project area, soil compaction and rutting; reduced soil permeability and root integrity; increased erosion and reduced vegetation health and productivity. Beneficial cumulative impacts from mine reclamation include improvements to vegetation through erosion control and revegetation.
Obed Wild and Scenic River	Catastrophic release.	Contamination of soils and vegetation from spill – oil and fire byproducts; damage and loss of vegetation and erosion of soils following fire.

Overall, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated operations would have a beneficial impact on vegetation in all category 1 and 2 park units, while exempt operations would cause adverse impacts stemming primarily from the current lack of regulation. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development occurring in the broader study area, the number of exempt wells involved, and the other cumulative actions affecting the resource in the entire study area.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in measurable impacts. Impacts on vegetation from permitted operations relating to loss or damage to vegetation or modification of certain types of wildlife habitat, site contamination, erosion and sedimentation, and introduction or spread of nonnative species would be as described for alternative A, no action.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations would not change the direct impacts of the footprint of well pads on vegetation; there would still be loss of plant productivity due to temporary vegetation removal and reestablishment of original vegetation within the footprint of previous disturbance. However, the change in regulation would reduce indirect impacts and the risks of impacts on vegetation from oil and gas operations because of the implementation of better operating practices, resulting in long-term beneficial impacts on vegetation. Impacts from site development and operation would include soil compaction and increased soil erosion from vehicle compaction and vegetation clearing, leading to adverse impacts on plant health and productivity from the potential release of hazardous or contaminating substances during drilling or production operations. However, once the rule change is implemented, these operations would need to meet the least damaging standard and other operating standards that are specified in the regulations. The operating standards and mitigation that would now apply to previously exempt operations include removal of contaminated soils, effective erosion control, plugging and capping all nonproductive wells,

maintaining areas of operations to avoid or minimize the cause of fire; recontouring and reestablishing native vegetative communities; controlling the invasion of exotic plant species; and overall proper site reclamation. This would result in reduced erosion and contaminated soil exposure, and a reduction in overall damage or loss of vegetation communities. The proposed rules also require that operators use native soil material and grade to conform the contours to elevations that maximize ecological value. For those operations on private lands (previously access-exempt) where there is a reasonable chance of accidents affecting vegetation on federal lands, bringing these operations within the scope of the 9B regulations will allow park managers to take a proactive approach to protecting the federal interest by ensuring that operations inside the park unit are conducted in a manner that offers the highest possible protection to a park's resources and values. As an additional component of obtaining an operations permit, site surveys may also be conducted at formerly access-exempt operations if deemed necessary to ensure that no impacts on special-status species would occur as a result of planned operations.

As previously discussed, oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs including rare vegetation communities and natural areas at several of the parks. The permitting of future plans of operations within these park units would be subject to these SMA setback recommendations, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Looking at site-specific information available for the nine parks with previously exempt operations, under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. Appendices E, F, and G list the special-status plant species known to occur or likely to occur at the parks with exempt operations. Surveys may need to be completed at the well locations of existing exempt operations to assess the presence of federal or state listed plant species, and appropriate mitigation taken to protect any species that are being adversely affected. Given the existing state of the operations, it is not likely that many special-status plants would be found on well pads or even on adjacent properties. For example, many of the species listed as occurring in Cuyahoga Valley National Park are plants that are found in forests or wetland, but there could be instances where damage had occurred due to runoff of contaminants or species would be present in areas that have become overgrown. Regulatory oversight under alternative B would also require that precautions be taken where possible to prevent impacts on sensitive geologic features such as cliff edges at Big South Fork National River and Recreation Area, which may support rare or unique plant species. Overall, beneficial effects would occur to vegetation through requirements to adhere to the 9B regulatory standards. Information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting park resources, including vegetation.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B, impacts on vegetation would be the same as described under alternative A.

Financial Assurance

Impacts affecting vegetation, such as soil erosion and contamination, would be remediated in a timelier manner with the enhanced financial assurance requirements under alternative B. Impacts on vegetation from seismic operations are not generally tied to inadequate bond amounts, so this provision would not have much of an impact on this specific phase of oil and gas development. However, adequate bonding for drilling and production phases would enable the NPS to reclaim sites sooner in the event of an operator default. This would result in a beneficial change to impacts on vegetation compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. This would reduce the risk that the NPS would suffer unnecessary loss of use and potential adverse impacts on vegetation because reclamation may be accelerated compared to the existing condition.

Enforcement and Penalties

Under alternative B, the new penalty provision that would be established which would allow the NPS to issue an operator citations to address minor acts of noncompliance would provide incentives for an operator to comply with the 9B regulations. That would, in turn, facilitate protection of park resources and values, including vegetation resulting in a long-term indirect beneficial impact compared to the existing condition.

Compensation for Access across Federally Owned Land

Under alternative B, beneficial impacts on vegetation may result from compensatory reclamation activities that may be done in lieu of an access fee. These activities would involve restoration of disturbed areas, including legacy oil and gas sites, to natural conditions. Over the long-term, beneficial impacts on vegetation would accrue from such reclamation measures completed under alternative B, compared to the existing condition.

Cost Recovery

Under alternative B, the increased monitoring and evaluation of operations that could be funded by permit application fees would allow for NPS to detect potential problems such as spills and releases or nonnative species establishment, and ensure operational compliance, thereby mitigating potential impacts on many resources including vegetation. Although permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to vegetation to the extent these funds were applied to increased monitoring and evaluation of operations. As a result, under alternative B, cost recovery could have a beneficial impact on vegetation, compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, both adverse and beneficial cumulative impacts would occur from projects, plans and actions and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on vegetation, as described in the above

analysis. Bringing previously exempt operations under regulation would add substantial beneficial impacts on vegetation. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on vegetation from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on vegetation at the site-specific level of analysis.

Directional Drilling

The regulation of directionally drilled wells under alternative C may potentially remove a key incentive for operators to locate operations outside of park units. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed (O’Dell pers. comm. 2013d) (see the “Socioeconomics” section). As a result of the changes in alternative C, operators may be more likely to select locations within park unit boundaries, thereby intensifying direct impacts on park resources, including vegetation. If surface locations are sited within the park unit boundaries, adverse effects on park vegetation would include those impacts previously described under “Typical Impacts of Oil and Gas Operations on Vegetation” and include damage and loss of vegetation and habitat where grading or construction of facilities had occurred, soil erosion and sedimentation associated with disturbed areas; introduction of nonnative species, and possible contamination from leaks and spills, leading to adverse impacts on plant health and productivity related to exploration and production activities that would be associated with wells. However, under NPS regulation of directionally drilled wells, plant species of special concern would be avoided, or mitigation would be required to reduce or eliminate adverse impacts to those species. This could reduce adverse impacts to those species that would not have been afforded protection on private property outside park boundaries without NPS regulation and would be a beneficial impact on species of special concern.

Therefore, alternative C would be likely to create additional long-term direct adverse impacts to vegetation within park units compared to the existing condition. However, a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas.

Enforcement and Penalties

Under alternative C, the new joint and several provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, would facilitate protection of park resources and values, including vegetation, resulting in a long-term indirect beneficial impact on vegetation.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, there would also be effects on vegetation that would occur as a result oil and gas operations that would continue to affect vegetation where impacts cannot be avoided, and benefits from bringing previously exempt operations under regulations and the resultant reduction in adverse impacts, as described in the alternative B analysis. Alternative C would contribute to cumulative impacts mostly by adding beneficial impacts of bringing previously exempt operations under regulation, but also by possibly adding adverse impacts from the change in directional drilling regulations that could result in more oil and gas development within park units as opposed to outside park boundaries. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on vegetation from the existing condition. Continuing impacts on vegetation from regulated and exempt operations would be expected. Impacts would be as described in the analysis, with an increased risk of more severe or extensive adverse impacts on access-exempt or grandfathered sites unless those sites changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations would result in impacts such as erosion (including off-site effects), contamination, introduction of nonnative plant species, change in plant health and productivity, and possible effects on unique geological features that support special-status plant species, if not protected. As a result, there would be continuing impacts from ongoing oil and gas activities occurring within the park units. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on vegetation. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including vegetation, due to delays in reclamation or possible lack of funding or enforcement. These factors can increase risk of impacts due to surface water runoff and accelerated soil erosion which can lead to degraded plant communities and habitat within the project area. Because the adverse effects under alternative A would be generally localized, would not result in widespread degradation of park vegetation, would be mitigated by setbacks and site reclamation, and because consultation requirements would protect special-status plants, these impacts would not be significant.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on vegetation in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects as described above would accrue from the continued unregulated operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term indirect beneficial impacts on vegetation, compared to the existing condition. Benefits would accrue primarily from reduced risk to vegetation due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the no-action alternative. This would result in removal of contaminated soils, effective erosion control, plugging and capping all nonproductive wells, maintaining areas of operations to avoid or minimize the cause of fire; recontouring and reestablishing native vegetative communities; controlling the invasion of exotic plant species; and overall proper site reclamation. This would result in reduced erosion and contaminated soil exposure, and a reduction in overall damage or loss of vegetation communities and special-status plants compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Overall these regulatory improvements would result in long-term indirect beneficial impacts on vegetation compared to the existing condition. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would be very limited in extent compared to the entire park area, and mitigation measures, stipulations, or consultation requirements would reduce the loss of vegetation and protect special status species, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations. Adverse impacts of oil and gas development would be localized, subject to regulatory review, and limited, and would not be significant.

Alternative C

Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells (operations located wholly on non-federally owned lands but still within the boundary of a park unit) not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on vegetation, especially to plant species of special management concern. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts on vegetation (such as soil erosion, contamination, introduction of nonnative plant species, change in plant health and productivity, and possible effects on unique habitats) within park boundaries, following the removal of regulatory incentives to locate operations outside of the park units, although

special-status species would be protected through consultation. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts such as to vegetation within park units compared to the existing condition, although these impacts would be localized and small in number. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on vegetation, primarily from bringing previously exempt operations under regulation. Because alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would be limited in extent compared to the entire park area, and mitigation measures, stipulations, or consultation requirements would reduce the loss of vegetation and protect special status species, the impacts of this alternative would not be significant.

Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial. Adverse impacts of oil and gas development would be localized, subject to regulatory review, and limited, and would not be significant.

WILDLIFE AND AQUATIC SPECIES (INCLUDING ANIMAL SPECIES OF SPECIAL MANAGEMENT CONCERN)

METHODOLOGY

Potential impacts on wildlife and aquatic species (including species of special management concern, also referred to as “special-status species”) are assessed in this section, based on the actions being proposed and characteristics of the fish and wildlife in the park units, and disturbance to their habitat that may be affected. Resource-specific context for assessing impacts of the alternatives to fish and wildlife resources includes the following:

- the type and amount of disturbance (threats) to wildlife and aquatic species and their habitat, including nonnative invasive species-related impacts occurring from oil and gas activities.
- the susceptibility of certain wildlife and aquatic species (including species of special management concern) to disturbance, loss, or modification of habitat from oil and gas activities.
- the presence of special-status animal species in park units and their potential to be present in areas of oil and gas development.

For the programmatic level analysis, a qualitative analysis of the potential impacts of oil and gas operations on the species was conducted based on actual experience of the NPS in management of non-federal oil and gas operations, professional judgment, and information available in the literature. Impacts on special-status animal species are addressed in a subsection following the discussion of impacts on wildlife in general. Data obtained from park natural resource contacts, oil and gas management plans, and the NPS Integrated Resource Management Applications web portal database were used to derive lists of special-status species that are likely to be found in the parks and their likely occurrence at exempt well sites based on available vegetation cover type data and habitat preference. This information for both plants and animals is found in appendices E, F, and G. Site-specific analysis includes an assessment of the susceptibility of the sites to contamination and other disturbances that can affect wildlife, aquatic species, and special-status species.

IMPACTS OF ALTERNATIVE A: NO ACTION

Typical Impacts of Oil and Gas Operations on Wildlife and Aquatic Species

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on wildlife and wildlife habitat can result from localized vegetation clearing and trimming for surveying and increased vehicular traffic associated with seismic investigations. Wildlife and aquatic species could be displaced or could experience increased stress and mortality and decreased production as a result of work crews trimming vegetation, or laying lines, and there could be temporary disturbance during the use of the seismic survey technologies due to noise and ground vibration. Impacts related to noise are usually temporary, with most wildlife avoiding or moving away from the source, but returning after noise is reduced or eliminated. Seismic survey disturbance would be very localized and intermittent, with the level of impact dependent on the strength of the vibration and proximity to the source. This impact would be relatively limited in extent during this phase. The introduction or spread of nonnative invasive vegetation could occur as a result of vehicular traffic. Invasive species have the ability to outcompete native plant communities and could influence the quality and availability of suitable wildlife habitat within the park sites through its invasion.

Surface disturbance from survey crews could also cause localized soil compaction which can increase runoff of surface waters and accelerate soil erosion (Duiker 2004; Penn State 2009), ultimately degrading wildlife habitat and nearby aquatic environments. The majority of impacts associated with these surveys are limited in extent and severity, because of the temporary nature of the disturbance and localized area disturbed by survey crews and their activity.

Impacts of Well Drilling and Production

Vegetation removal and soil disturbance associated with the construction and installation of well pads, pipelines, access roads, and other facilities would affect wildlife both directly and indirectly. Indirect effects would include loss of habitat through removal of vegetation by clearing, grading, cutting, filling, and leveling of the site using heavy construction equipment during site preparation. This activity may also affect habitat structure, species composition, and the extent of vegetation available to wildlife. Other indirect impacts may include changes in distribution, stress or activity, caused by increased human disturbances associated with energy development (e.g., traffic, noise, human use) (Sawyer et al. 2002). Site clearing to accommodate a well drilling rig and associated equipment would remove 1.5 to 4 acres of vegetation for each well pad resulting in a permanent conversion of the habitat type to an industrial use.

The degree of impact would depend on the type and amount of habitat affected, the rate at which the site would regenerate after construction, and the frequency of maintenance conducted during operation. For example, surface disturbance to sagebrush steppe vegetation may adversely affect wildlife species that depend on sagebrush for some life history function, as it may take 10 to 20 years for the vegetation to become reestablished. Certain locations within Aztec Ruins and Dinosaur National Monuments; Fort Union Trading Post, Nicodemus, and Washita Battlefield National Historic Sites; Santa Monica Mountains National Recreation Area; and Grand Teton and Theodore Roosevelt National Parks support this type of vegetation community. Loss of a specific habitat type may also affect neotropical migrant bird species, many of which prefer a more mature tree canopy that could be removed in more heavily forested areas of in Eastern Broadleaf Forest (Oceanic) Provinces such as Big South Fork, Cumberland Gap, and Cuyahoga Valley. Also, disturbances or habitat loss in park units with larger holdings of wetlands and floodplains such as Big South Fork National River and Recreation Area, Cuyahoga Valley National Park, and Lake Meredith National Recreation Area could affect migratory bird species during seasonal stopovers by reducing the quality and availability of resting and feeding grounds.

Fragmentation of existing wildlife habitats, which can occur from oil and gas well development, can also decrease an area's functional capacity to support wildlife populations at nonimpacted levels (Trombulak and Frissell 2000). Fragmentation refers to breaking up contiguous areas of vegetation/habitat into smaller patches that become progressively smaller and isolated over time. Among other effects, fragmentation of habitat allows predator access to breeding sites used by birds and small mammals along newly created corridors and through edges of habitats that were previously continuous (Johnson 2001).

Direct impacts to wildlife include increased mortality that could result from vehicles, construction activities, and increased access into previously inaccessible areas. Wildlife and aquatic species, particularly small mammals, invertebrates, and herpetofauna (reptiles and amphibians), that cannot escape an area during construction, could be killed, and increased mortality of small mammals is also likely to occur along access roads. New access roads may increase ease of access by humans into formerly remote areas, opening up areas to increased poaching and legal hunting and fishing, and possibly promote new uses such as logging, agriculture, mining, and development (Trombulak and Frissell 2000). Such changes in land cover and land and water use may result in severe and persistent adverse effects on wildlife and wildlife habitat in the park units. The park unit management, however, can close or restrict motorized public access on roads that are to be used for oil and gas development, if necessary. With this authority, the NPS can mitigate the effects of increased public access via oil and gas access roads.

Species that inhabit or frequent areas with sites that have had releases of oil or other chemicals could be harmed or killed through direct exposure with the released materials or indirectly through degraded water quality (e.g., low pH, reduced dissolved oxygen, or sediment toxicity). If releases are transported into waterways, wildlife and aquatic species occupying or using the water could be directly impacted. The severity of impacts would depend on the type and amount of pollutant released, physical and environmental factors of the site, the method and speed with which cleanup occurs, and the sensitivity of wildlife and aquatic species to these impacts during different stages of their life cycle. The NPS recognizes that unplanned incidents associated with oil and gas operations such as well blowouts, fires, and major spills within the boundaries of the park present a risk of release of contaminants that can adversely impact wildlife and aquatic species.

Contamination from the release of produced waters containing salts and other well drilling fluids could impact wildlife resources in the park units. For example, such instances of leaks from salt-water disposal wells and subsequent contamination occurring as the result of mechanical problems and improper operating practices have been documented at Big Thicket National Preserve (NPS 2013). These substances may contain relatively large concentrations of dissolved salts, particularly sodium chloride, and can have salt concentrations greater than ocean water. Releases of produced waters (brine) can create salt licks, which may affect the behavior of large mammals and ungulates (NPS 2012b).

Ground disturbance could also promote the introduction of nonnative plant species by altering habitats, stressing native species, and providing movement corridors (Trombulak and Frissell 2000). A landscape invaded by nonnative species would not support native wildlife populations as effectively as a landscape with native vegetation. Construction that alters the canopy structure of forests, for example, can promote invasion by understory plants, which affects animal communities (e.g., food, nesting, and screening). Such vegetation is present in every NPS park and various management efforts are ongoing to deal with the establishment and spread of invasive species.

There may be aquatic species habitat degradation from road construction and use, construction of well pads, and placement of pipelines in drainages where these species occur. These effects could decrease the long-term viability of populations as a result of increased sedimentation from construction activities and long-term use. Some risk of direct mortality of aquatic species could occur if a pipeline ruptures at a stream crossing or if toxic materials (such as diesel fuel or produced waste water) are spilled into streams.

Noise from drilling or well servicing operations would also impact wildlife. Potential adverse effects from well drilling and production could include changes in species distribution and use of the area, increased energy expenditure, decreased reproductive success (breeding and nesting success), deafness in species with specialized hearing, and increased stress levels from the noise and disturbance associated with activities (Sawyer et al. 2002). Drilling operations introduce noise with the highest measurements in the 90 dBA (A-weighted decibel) range for a period of a week or two up to a few months, with noise coming mostly from multiple diesel engines. Therefore, noise impacts could be severe, but limited to a localized area and relatively short duration.

Some facilities associated with production operations (i.e., heater treater units/separator units) could kill bats, migratory birds, and raptors through asphyxiation or incineration.

Impacts of Plugging and Reclamation

Although well plugging and surface reclamation results in overall beneficial impacts on wildlife and aquatic species, activities associated with the reclamation process may affect wildlife and aquatic species. Plugging and abandonment operations and site preparation during reclamation would introduce heavy equipment, along with increased noise levels, for a short time. This could disturb wildlife and aquatic species and cause them to temporarily avoid the area. Vehicle use on and vegetation clearing of access roads and well pads may adversely affect wildlife and aquatic species by increasing poaching in open areas and may temporarily disrupt feeding, denning, spawning/reproduction, and other wildlife behaviors. Plugging and reclamation activities may increase human access and edge effects and temporarily alter wildlife and aquatic species composition and migration. The use of heavy equipment and vehicles to plug and reclaim sites could have the potential for releases of oil and other contaminating and hazardous substances, which could harm or kill aquatic and wildlife species. Recovery of vegetation communities, and ultimately habitat, would be primarily dependent on location, soil conditions, precipitation, and type of community desired. Except for rare vegetation communities that are susceptible to the adverse impacts of oil and gas operations, most vegetation communities in the park units would be expected to reestablish in a relatively short time.

Wherever access roads have been built or are used for the primary purpose of allowing access for oil and gas operations, access roads would be reclaimed at the completion of operations. This would return the area to its natural conditions, thereby having a beneficial impact on the park environment. As oil and gas operations are plugged and abandoned, wildlife and aquatic species habitat would be reclaimed. Wherever possible, habitats would be improved to perpetuate the viability of habitats and increase the survivability of species. The reclamation of the previously disturbed areas, including monitoring for exotic species, would also enhance native plant communities in the project areas, and over time, reduce fragmentation. Reclamation of sites would have a beneficial impact on habitat for many species, including many birds and small mammals, when the areas have regrown. This would result in long-term beneficial impacts on native species, their habitat, and the natural processes sustaining them.

Typical Impacts of Oil and Gas Operations on Special-status Species

The NPS parks included within the network provide habitat that supports many species of wildlife and aquatic species that are threatened, endangered, or of special concern at the national, regional, and local level. The NPS *Management Policies 2006*, section 4.4.2.3 states that the NPS will manage state and locally listed species within park units in a manner similar to its treatment of federally listed species to the greatest extent possible. The conservation of special-status species and their habitats is integral to maintaining biological diversity.

Some of these species and their habitats may occur in areas suitable for oil and gas development. For instance, the federally endangered Florida panther is present throughout southwestern Florida, including Everglades National Park and Big Cypress National Preserve. Given the programmatic nature of this analysis, the exact locations of future operations are unknown, and site-specific surveys for presence or absence of special-status species at all existing wells may not have been completed. Wells with current permits would have gone through a review for the presence of special-status species at the time of permitting.

Impacts to special-status animals from oil and gas operations can occur during geophysical exploration, drilling and production, or reclamation phases of development. As noted in the following analysis, impacts on special-status animals are usually avoided or mitigated through consultation with the USFWS (or similar state agency), use of project area surveys, and completion of biological assessments where adverse impacts could occur.

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on special-status species and their habitat would be similar in nature to those of common wildlife and aquatic species habitats if exploration activities are permitted. Localized trampling of vegetation for surveying and increased vehicular traffic associated with nearby seismic investigations could lead to injury or destruction of sensitive species and their habitat. These operations would be required to avoid impacting species of special concern and their habitat, which would be identified through consulting park biologists or through biological surveys, if determined necessary by the NPS through consultation with federal or state agency biologists. When species of special concern and their habitat are found to be within the project area, application of mitigation measures, including sufficient setbacks and/or timing restrictions for sensitive periods in a given species' life cycle, would result in avoiding or minimizing potential adverse effects.

Potential effects from exploration operations could include increased displacement, increased risk of mortality, decreased reproductive success, and increased stress levels from the noise and disturbance associated with nearby seismic survey activities (Sawyer et al. 2002). These effects could be caused by seismic crews traveling to access the area to be surveyed and by pedestrian travel along receiver lines, as well as the vibrations from the seismic operations, trimming vegetation, and using vehicles on existing roads. Surface disturbance from vehicles could also cause localized soil compaction which can increase runoff of surface waters and accelerate soil erosion (Duiker 2004; Penn State 2009), ultimately degrading sensitive habitats. Surface disturbance from survey crews traversing the area during geophysical exploration could also introduce or spread nonnative invasive vegetation. The majority of impacts associated with these surveys would be limited in extent and severity, because of the temporary nature of the disturbance and localized area disturbed by survey crews and their activity.

Types of species that could be affected by these activities are the species listed in appendices E and F, including a variety of mammals, birds, mammals, fish, and invertebrates species. Listed species could be particularly impacted by the noise associated with seismic survey work, especially vehicle noise. Impacts related to noise are usually temporary, with nearby species avoiding or moving away from the source but returning after noise is reduced or eliminated. Geophysical operations are short term and would have very limited impact on animals given the short duration of operations and pre-operations surveys.

Water quality protection is provided by 36 CFR 9.41(a), which requires operations to be offset 500 feet from the banks of perennial, intermittent, or ephemeral watercourses, unless specifically authorized by an approved plan of operations, which would minimize erosion and sedimentation and other impacts on water quality and quantity that could adversely impact aquatic species such as invertebrates and fish.

The standard 500-foot setback from water bodies or equivalent protection included in the permit for geophysical operations would protect fish, wildlife using water, and wetland vegetation within this protective zone, which supports many special-status species. Through project-specific consultation with USFWS under the ESA, and scoping with or other state agency biologists, the setback could be increased. The 500-foot standard setback would provide primary protection to many of the species described in appendices E and F. Additional protection to these habitats would be provided by the wetlands and floodplains Executive Orders, NPS Director's Orders, and project-specific permitting requirements.

Mitigation measures, including setbacks and/or timing restrictions, would result in avoiding or minimizing potential adverse effects on many special-status species, such as listed bats potentially roosting or hibernating in Cuyahoga Valley National Park and Gauley River National Recreation Area. Additionally, upon the completion of exploration operations, reclamation of any disturbed areas would be required, and recovery of any habitat that was disturbed is expected to occur over the short term. Application of these requirements would result in short-term and small adverse impacts on special-status species or their habitat from geophysical exploration.

Impacts of Well Drilling and Production

Although drilling and production operations could directly impact species of special concern or their habitat in general, these operations would not be permitted under current ESA if the operations would result in excessive take or jeopardy of the species. Under the 9B regulations, the operator is required to conduct a pre-operational analysis to adequately describe the natural, social, and economic environments that would be affected by the operations. These surveys may include threatened and endangered species (36 CFR 9.36(a)(16)(i)). However, operations could result in indirect impacts on special-status species, primarily from the disturbance related to construction of new well pads, access roads, flowlines, and pipelines. These impacts would be similar in nature to those of common wildlife and aquatic species. Drilling and production operations could range in duration from short term (weeks or months for well drilling and construction of roads, well pads, flowlines, and pipelines) to long term (lasting 20 years or more for road, flowline, pipeline, well, and production operations). Construction and maintenance of roads, pads, flowlines, and pipelines could require the clearing of vegetation and could result in habitat loss or fragmentation. Construction of open pits to hold large volumes of drilling mud and drill cuttings could also be a source of mortality for birds, reptiles, amphibians, and other wildlife within the park units.

Habitat (forest) fragmentation could adversely affect some neotropical migrants that are species of special concern, such as the Cerulean warbler and Swainson's warbler which occur at Cuyahoga Valley National Park and Big South Fork National River and Recreation Area, respectively, and the American swallow-tailed kite at Big Thicket National Preserve. Potential effects on species of special concern would depend on where drilling and production operations are located. Careful siting of development based on biological survey and/or site assessment results could avoid or minimize these impacts substantially.

If vegetation clearing is unavoidable, it would be limited in extent and mitigation would require that least damaging methods are used for site preparation. In sensitive communities, a large effort would be made during planning and operation to avoid or minimize alteration of the surface area more than necessary, which might include drilling multiple wells from one pad.

Water-dependent species (including fish, mussels, and other invertebrates) could be impacted by the construction and long-term maintenance of roads, pads, flowlines, and pipelines if stream crossings result in alteration of streamflow, water quality, or temperature or in increased sedimentation. Waterways would be protected by a 500-foot setback under 36 CFR 9.41(a), unless specifically authorized by an approved plan of operations; also, because waterways are inherently a part of floodplains (riparian corridors) and wetland areas, and receive added protection under various regulatory and policy requirements,

streamflows, water quality, and water temperature would be protected from disturbance and water levels would be maintained. When there are no practicable alternatives to locating an operation or activity in floodplains and wetlands, careful siting of facilities and application of stringent mitigation measures would be expected to avoid potential adverse impacts on special-status species and their habitat. Required mitigation for direct and indirect impacts on wetlands could be used to restore wetland habitats and increase species of special concern habitat values.

Displacement of wildlife would continue from initial well pad construction into exploratory drilling, and if the well is placed in production, during the life of the producing well. The increase and ease of public access routes may serve to increase public motorized travel, or if the roads are closed to public motorized travel, they would still serve as access routes on foot, horseback, and mountain bike.

Noise from drilling operations would also impact protected wildlife species. Drilling operations introduce noise with the highest measurements in the 90 dBA range for a period of a week or two up to a few months, with noise coming mostly from multiple diesel engines. Therefore, noise impacts on terrestrial species would be moderate, but limited to a localized area and of relatively short duration. Preconstruction surveys would be done to ensure that impacts on species of special concern, such as bats and birds, would not be excessive.

Some facilities associated with production operations (i.e., heater treater units/separator units) could cause the mortality of special-status bats or birds through asphyxiation or incineration, and mitigation such as a cone device placed on top of all vent stacks could be required to prevent perching and access. Open containers that collect stormwater may be required to have netting or covers to prevent wildlife species from accessing stormwater that may have contacted and mixed with oil, gas, and other contaminating and hazardous substances.

Releases of hazardous or contaminating substances could also pose a threat to special-status species, because exposure to or ingestion of these substances could result in death of a species or impact overall health and survival of affected special-status species and their habitats.

Potential effects on special-status species would depend on where drilling and production operations are located within the units. Careful siting of developments based on biological survey and/or assessment results could avoid or minimize these impacts substantially. Through the required biological surveys and/or assessments and consultations with USFWS and other state agency biologists, potential impacts on special-status species and their habitat would be identified, and the application of appropriate mitigation measures would reduce impacts.

Impacts of Plugging and Reclamation

Well plugging; shutting down, abandoning, and removing flowlines and pipelines; and use of heavy equipment and vehicles to reclaim sites could have the potential for releases of oil and other contaminating and hazardous substances, which could harm or kill special-status species. However, ongoing consultation under the ESA; performing biological surveys of the area that could be potentially impacted by proposed plugging, abandonment, and reclamation operations; identifying protected species; and applying appropriate mitigation would likely result in localized and minimal adverse impacts on special-status species.

Plugging operations and site preparation during reclamation would introduce heavy equipment and people, along with increased noise levels, for a short time. These operations would generally result in localized minimal adverse impacts, but the effect would depend on the season, the background sound levels, and the proximity of operations to species of special concern. Seasonal restrictions would include

delaying activities until after a species' nesting or spawning seasons. Access roads that have been developed or allowed to remain open for the primary purpose of allowing access for oil and gas operations would be reclaimed at the completion of operations, returning the area to its natural condition. Wherever possible, habitats would be improved to perpetuate the viability of habitats and increase the survivability of special-status species. The outcome of these activities, in returning natural conditions to the operations area, would have long-term beneficial impacts.

If restored properly, few effects on special-status species would be anticipated and impacts would not affect the overall viability of these species and their habitats. Avoiding areas of known sensitive species and timing of reclamation to avoid conflicts with critical growth periods would reduce impacts on special-status species and encourage restoration success during this phase. Overall, reclamation of the sites would promote beneficial effects on wildlife and their habitat over the long term.

Regulated Operations (Current and Future)

Impacts on wildlife and aquatic species that would occur from ongoing or future permitted oil and gas drilling and production operations include those described above under "Typical Impacts of Oil and Gas Operations on Wildlife and Aquatic Species." Potential impacts occurring within the footprint of disturbance during drilling and production include: habitat fragmentation or loss of habitat due to vegetation and site clearing; possible direct injury to or mortality of less mobile species; noise and associated species displacement or stress; and spills or releases of harmful substances. Current data indicate that there are 215 wells under plans of operation in the category 1 park units. Direct surface disturbances from well pads range, on average, from 0.1 to 1 acre for non-directionally drilled operations, with the average area of road disturbance ranging from 0.4 to 1.2 acres per operation. Current permitted operations are adversely affecting approximately 305 acres of potential wildlife habitat. The historic average of new drilling operations is about 4 proposals per year (NPS 2013). Therefore, approximately 6 additional acres per year could be impacted from future well development assuming those operations are not access exempt.

Regulated operations are subject to the 9B regulations, which require that operating standards be met. Current operating standards specifically within the regulations include precautions for well control, proper handling of wastes, site security, siting restrictions, and conduct of operations in a "safe and workmanlike manner (see current 36 CFR 9.41 – 9.46). Additional resource-specific standards and recommended actions to achieve them are included in the NPS Operators Handbook (NPS 2006b). In addition, under the current approval process for plans of operation, the NPS works with operators to identify the relevant resource and visitor value issues and operating standards on a site-specific basis, which leads to the appropriate mitigation measures being incorporated into an approved plan of operations. Consultation with USFWS and other natural resource agencies would occur prior to beginning operations (see the section "Wildlife and Aquatic Species") and would result in identification of potential impacts on species of special concern and their habitat, and the application of mitigation measures. During drilling and production, protection measures would include:

- use of containerized mud systems;
- placement of acceptable fencing around appurtenant equipment to secure production operation sites; netting on storage tanks and vent stacks to minimize impacts on migratory birds and bats;
- scheduling work during time least likely to affect wildlife species, especially during times of active denning, nesting, spawning, migration, or feeding;
- use of existing disturbed areas (including multiple wells in same well pad) to the extent feasible; avoidance of active wildlife areas; reduction of vehicle speed to limit injury to wildlife;

- minimizing waterbody crossings;
- reduction of light and noise impacts;
- removal of contaminated soils, debris and equipment no longer needed in operations;
- use of effective erosion control measures.

Any effects of drilling and production operations on aquatic species would depend on where new production ultimately occurs, and careful siting of developments could avoid or substantially minimize impacts such as degradation of habitat due to vegetation and site clearing, habitat fragmentation, possible injury to or mortality of less mobile species, degraded water quality, and spills or releases of harmful substances into surface waters. Because waterways are inherently a part of floodplains (riparian corridors) and wetland areas, they receive added protection under the Executive Orders and NPS implementing guidelines for protection of wetlands and floodplains, and are protected by a 500-foot setback under the 9B regulations (unless specifically authorized by an approved plan of operations). These protective measures promote the proper protection of water levels, stream temperatures, water quality, and streamflow. When there are no practicable alternatives to locating an operation or activity in floodplains and wetlands, careful siting of facilities and application of stringent mitigation measures are expected to minimize potential impacts. Required compensatory mitigation for direct and indirect impacts on wetlands could be used to restore wetlands habitats and increase wildlife and aquatic species habitat values.

Identification of wildlife and aquatic species habitat through biological surveys, if needed, would result in development of further mitigation measures intended to avoid or minimize impacts caused by habitat removal. These surveys must be performed by biologists who have sufficient technical knowledge and/or experience to appropriately time when and how surveys are performed, and who are qualified to identify the species (and habitat of the species) that are present or may potentially use the area.

Drilling muds, hydrocarbons, produced waters, or treatment chemicals could be released during drilling, production, or transport, with potentially severe adverse impacts. However, with mitigation such as primary and secondary containment on a well pad, and prompt response in the event of a spill, the intensity of adverse impacts would be reduced. To further mitigate the residual impacts on wildlife and aquatic species from oil and gas during the operational lifetime of the facilities, mitigation such as a cone device placed on top of all vent stacks to prevent perching and access may be required. Inaccessibility to the vent stacks would curtail any potential mortality of bats and birds. Another protective measure that may be required is netting or covering open containers that collect stormwater. This requirement prevents bird and other wildlife species from accessing stormwater that has come in contact with and mixed with oil, gas, and other contaminating and hazardous substances.

During geophysical exploration, impacts on wildlife and aquatic species from currently regulated and future operations also include the effects of seismic surveys that are conducted within the category 1 park units and may be conducted in category 2 park units. Since 1998, 20 seismic surveys have been conducted in 6 parks for an average of 1.4 surveys per year. All but one have been 3-dimensional seismic surveys covering large geographic areas. Going forward, the level of seismic activity is expected to taper off to about one proposed survey per year (NPS 2013). Impacts of these surveys include those described above under “Typical Impacts of Oil and Gas Operations on Wildlife and Aquatic Species.” The exact extent of the surveys varies from operation to operation. However, under the current regulations, operations would need to meet the least damaging standard so that disturbance and loss of species and habitat would be avoided or minimized. Vegetation would be cleared in accordance with current vegetation management plans or policies, and effective erosion and sedimentation control would be employed. Seasonal timing, trip limits, and use of existing roads and trails to the maximum extent feasible may also minimize impacts

on wildlife and their habitats. Measures would be taken to reduce the introduction of nonnative plant species from equipment and vehicles entering the project area. Accumulation of oil and other waste materials deemed to be fire and environmental hazards would be cleaned up and disposed of properly. The implementation of these measures would reduce the extent or intensity of impacts on wildlife and aquatic species during the exploration phase.

Oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, including some that were designated to protect wildlife. For example, no surface use (exploration, drilling, and production) would be allowed in the “State Natural Areas SMA” at Big South Fork National River and Recreation Area under the oil and gas management plan framework unless other mitigation that protects SMA resources and values is included and authorized in an approved plan of operations (NPS 2012b). Under the oil and gas management plan for Lake Meredith National Recreation Area, a “No Surface Use” stipulation, where new non-federal oil and gas operations would not be permitted, would apply to the “Bird Rookery SMA” and several “Threatened and Endangered Species SMAs,” including the following: the “Arkansas River Shiner Critical Habitat SMA” (which includes the length of the Canadian River from the western boundary of Lake Meredith National Recreation Area downstream to the confluence with Coetas Creek and including a lateral distance of 300 feet on each side of the river beyond bankfull width); the “Bald Eagle Winter Roosting Site SMA” (which is one site, with a 1,500-foot setback from the roosting site); and the “Black-Tailed Prairie Dog Colony SMA” (where there are currently no sites) (NPS 2002b). At Big Thicket, the oil and gas management plan stipulates a 1,500-foot offset for drilling and production, and a 500-foot offset for geophysical operations, from birding hot spots identified in the plan. At Padre Island National Seashore, the oil and gas management plan identifies the Rookery Islands as a sensitive resource area totaling 530 acres to be closed to surface access associated with non-federal oil and gas operations (NPS 2000b). The permitting of future plans of operations within these park units would be subject to these SMA setback or other restrictions, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

When current operations end and wells are plugged and sites are reclaimed, impacts on wildlife and aquatic species would be as described under “Typical Impacts of Oil and Gas Operations on Wildlife and Aquatic Species.” For production operations, the NPS has found that plugging and reclamation of old wells has essentially offset drilling and production of new wells. In the category 1 park units, 215 well sites that are under permit would eventually be reclaimed, representing 305 acres of vegetation that would be restored. Current projections are that about 4 existing wells per year would be plugged and reclaimed (NPS 2013). Impacts during well plugging and surface reclamation would be avoided or minimized through prompt restoration following completion of operations, provision of safe movement for native wildlife, and reestablishment of native vegetation communities. Provisions in the current regulations and approval process for well plugging ensure that sites are reclaimed properly and benefits are realized. Meeting the NPS requirement of leaving the site in a clean and safe condition in preparation for surface reclamation often involves disposing of waste materials outside of the park, control of nonnative species and reestablishment of native vegetation community. Beneficial impacts of plugging and reclamation are realized in the short term and over the long term as site vegetation becomes reestablished.

Currently Exempt Operations

Under the no-action alternative, existing and future “access-exempt” operations and existing grandfathered operations would also result in impacts on wildlife and aquatic species and their habitats, and these impacts are often more extensive or more severe compared to impacts that occur from regulated

operations, because exempt operations are not subject to NPS operating standards and mitigation measures that would serve to remove or reduce impacts. For example, the risk of accidental releases reaching more area of the well pad or off-site locations is greater for those wells that are exempt because they are not required to have some of the more protective measures that are mandated under the 9B regulations and permit review process.

The following discussion provides more site-specific detail of the current and potential impacts on wildlife and aquatic species from activities associated with these currently exempt operations. Currently there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. Impacts on wildlife and aquatic species and possibly the 12 special-status species that would occur from ongoing exempt operations include those described above under “Typical Impacts of Oil and Gas Operations on Wildlife and Aquatic Species.” However, because these operations are not fully regulated, there is a higher level of risk of impacts on wildlife and aquatic species and special-status species from loss or disruption of habitat due to vegetation and site clearing, habitat fragmentation, possible injury to or mortality of less mobile species, noise and associated species displacement or stress, continuous but minor leaks, lack of erosion and sediment control measures, or locations close to sensitive resources. For exempt operations, it is unlikely that surveys for special-status species were conducted, since consultation was not required under ESA, because no federal permit triggered an ESA review during the development of the operation, and many state oil and gas rules do not address endangered or threatened species or may be lacking in that area of protection. However, the likelihood of special-status wildlife species to occur on or near the exempt well locations within the category 1 parks, was estimated based on the site-specific vegetation cover types reported in the NPS database and the habitat preferences of the species.

Based on available information and habitat preferences of species on or near the exempt well locations, only four park units are likely to support 12 special-status wildlife species. Lake Meredith National Recreation Area may support preferred habitat for the endangered black-footed ferret at 10 well sites, the endangered interior least tern at 1 well site, the threatened lesser prairie chicken at 12 well sites, and the endangered northern Aplomado falcon at 17 well sites. One well site within Big Thicket National Preserve may contain preferred habitat for the federally endangered red-cockaded woodpecker. Cuyahoga Valley National Park may contain preferred habitat for the federally endangered Indiana bat at or near 50 well sites. Four species of concern; northern long-eared bat, bald eagle, Henslow’s sparrow, and cerulean warbler, may also likely occur at Cuyahoga Valley National Park. Gauley River National Recreation Area may likely support the endangered Virginia big-eared bat at or near seven well sites as well as Indiana bat at or near seven well sites. This park may likely host the Diana fritillary, a species of concern at or near seven well sites.

Similar to regulated operations, one of the primary effects on wildlife from access-exempt oil and gas operations stem from the fact that habitat is taken out of beneficial use where it has been removed or disturbed in the footprint of the well pad. There is also increased potential for the introduction and establishment of nonnative invasive species in the project area. Direct surface disturbances from well pads range, on average, from 0.1 to 1 acre for non-directionally drilled operations, with the average area of road disturbance ranging from 0.4 to 1.2 acres per operation. For grandfathered operations, potential wildlife habitat would be disturbed or removed on approximately 326 acres, resulting in long-term impacts that would last until reclamation is complete. The amount of wildlife habitat on access roads that would continue to be adversely affected would vary, depending on road length and the need for access.

Exempt operations have the potential for continuing adverse impacts from loss, degradation, or fragmentation of habitat, exposure to and disposal of waste and hazardous substances and lack of a spill prevention plan to reduce impacts on wildlife. NPS inventory data has documented many instances of habitat degradation as a result of soil contamination and erosion on grandfathered sites that do not rise to the level of warranting suspension. Poor operating practices at these sites sometimes leads to spills, leaks

and other releases of oils, produced water, or other chemicals that can contaminate soils and water and affect wildlife and aquatic species. Releases of oils or chemicals have contaminated soils and water and have not been cleaned up because of lack of regulation and associated oversight. Also, the use of pits instead of containerized mud systems has resulted in contamination of soils and water from drilling muds. Adverse impacts resulting from instances of site contamination at exempt wells can occur through decreases in habitat quality, both on private property and on nearby park property if contamination spreads off site. Site-specific inspection report data reveal 55 instances of currently exempt operations that have been documented as having some form of contamination (wellhead leaks, spills, tank battery or pump jack leaks) occurring on site (see “Geology and Soils” topic). Appendix D presents information regarding the instances of known site contamination for each park unit with exempt operations. Erosion of soils has also occurred at these sites because erosion control measures may not be adequate on the site or access roads, but does not rise to the level of an imminent threat of significant injury. Under the no-action alternative, issues of contamination occurring at sites of exempt operations are expected to continue or to be cleaned up at the discretion of the operator, resulting in a continued potential for long-term adverse impacts on wildlife and habitat if the contamination is not remediated in a timely manner.

For access-exempt operations, impacts on wildlife and aquatic species and special-status species would be indirect because they would occur on non-federal lands.

In addition to removal and fragmentation of habitat from production and contamination, exempt operations also have impacts on habitat due to soil erosion. Erosion and sedimentation control measures may not be present or used by operators that do not need to follow 9B regulatory standards and are not subject to standards (access-exempt operations) or are subject only to a standard of not being an imminent threat (grandfathered operations). As discussed in the “Geology and Soils” section in this EIS, the majority of the soils in the category 1 park units have a moderate to high erosion potential. Of all soil types present in the vicinity of exempt operations, soils with the most potential to be eroded are found within Lake Meredith National Recreation Area, Big Thicket National Preserve, and Cuyahoga Valley National Park.

Directional Drilling

Under the no-action alternative, the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units avoids direct impacts to wildlife and special-status species within the park units. However, wells directionally drilled and produced from outside park units to bottomholes beneath the park units would directly impact wildlife on adjacent lands as well as presenting a risk of indirect impacts within the park units. Under the 9B regulations, the NPS cannot require preventative mitigation measures even if operations may indirectly affect park resources by their proximity to park boundaries. As discussed under Geology and Soils, the use of reserve pits instead of containerized mud systems could result in a greater risk for indirect impacts on park resources over time. Pits can act as a trap for both bats and birds if left uncovered. Impacts could also occur from soil erosion and runoff or contaminant release, and the risk and intensity of impacts would increase for operations sited closer to park boundaries where runoff or contaminants can be transported downslope into park units through streams, gullies, or overland flow. Intensity of impacts on park wildlife and aquatic species would depend on proximity of operations to the park units; site specific environmental conditions, such as steepness and direction of slope, surface hydrology and vegetated surface; and mitigation measures being employed. Reclamation of the well pads and access roads of well sites drilled from outside the park units would benefit wildlife and associated habitat.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limits, it is likely that many sites would have insufficient bonding for reclamation. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, remediation of well sites could be delayed indefinitely. Until well plugging and surface reclamation is completed, there would be loss of use and potential adverse impacts on wildlife and aquatic species and their habitat. There are instances where the current bonding is adequate to reclaim sites to the point of impact reduction by providing for grading and revegetation. Because performance bond amounts rarely approach \$200,000 for seismic operations, impacts on wildlife from these operations are not generally tied to inadequate bond amounts. However, delayed reclamation would result in immediate and unnecessary adverse impacts on wildlife and aquatic species and special-status species and their habitat that could become long-term impacts.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations impacts on wildlife and aquatic species and their habitat could result from leaks or spills that could occur with no financial assurance to cover the cost of cleanup if there is no performance bond in place. If the new owner defaults before posting financial assurance, the NPS would need to seek and acquire funding for cleanup or reclamation. Reclamation could be delayed indefinitely. Over the interim period, the NPS would suffer loss of use, and potential adverse impacts on wildlife and aquatic species and special-status species would continue until they were properly mitigated. These impacts would include adverse impacts on habitat quality and availability from the potential release of hazardous or contaminating substances during drilling or production operations.

Enforcement and Penalties

Under the no-action alternative the absence of penalties for minor acts of noncompliance would result in the continued lack of incentive for operators to comply fully with NPS operating standards. This increases the risk of unnecessary impacts to wildlife and aquatic species and special-status species from spills, increased erosion, or improper restoration.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages and any associated loss of wildlife habitat that results from privileged use of federal surface estate.

Cost Recovery

Under the no-action alternative, lack of cost recovery could have an indirect adverse impact on natural resources, including wildlife and aquatic species and special-status species, because additional money collected to support the NPS permitting, monitoring, and compliance programs could be used to enhance resource protection. Therefore, the non-recovery of costs under the no-action alternative would result in adverse impacts on wildlife.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect wildlife and aquatic species present at the parks. Management planning, such as fire management, vegetation management, ORV, and oil and gas management plans, can result in greater protection for these resources. Conversely, actions that cause disturbance of these resources would include activities

such as prescribed burns, recreation and ORV use, water use, mining, agricultural and logging activities, and grazing, as well as any general development activities that include excavation, grading, or construction. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on wildlife resources in the area of analysis (including both park lands and adjacent lands) and a brief summary of the cumulative impacts of these actions on this resource are listed in table 54. It is recognized that many of these actions would involve reviews for protected special-status species, but many would occur off park lands and without any federal permit requirement and would also have the potential for effects on listed species as well as regular wildlife.

TABLE 54. CUMULATIVE IMPACTS ON WILDLIFE AND AQUATIC SPECIES (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Wildlife and Aquatic Species
Prescribed fires and fire management actions	Short-term and long-term adverse effects on species productivity following removal of vegetation and habitat; short and long-term impacts from fire line construction that requires digging and displacement of vegetation matter from burning of surface litter and topsoil. Long-term beneficial effects of reduced fire occurrences with managed burns that reduce the possibility of catastrophic and high intensity fire; improved productivity and erosion control from vegetative cover that is established after these treatments.
NPS facility and road construction	Short-term and long-term adverse effects on species from direct loss or damage to soils and habitat when removed for development; and compaction of soils and damage or loss of wildlife and habitat during road grading and construction using heavy equipment. Short-term to long-term adverse impacts from the loss of habitat and ground disturbance/soil erosion and compaction.
Vegetation management	Short-term adverse impacts due to vegetation clearing, habitat fragmentation, and effects on soils. Long-term beneficial effects of erosion control from improved habitat quality. Short term adverse impacts with long-term beneficial effects from site reclamation. Long-term beneficial effects of controlling the introduction and spread of nonnative invasive species.
Trails development and maintenance	Short-term and long-term adverse effects on wildlife habitat from clearing, grading and surfacing of trails, removal of vegetation in trail footprint for maintenance, habitat fragmentation, increased disturbance and predation, and potential introduction of nonnative plant species.
ORV use	Short- and long-term adverse effects on habitat from compaction and vehicle-related disturbances and mortality of wildlife species.
Abandoned mine lands reclamation	Short-term adverse effects on habitat during reclamation-related disturbances. Long-term beneficial effects of improved surface (revegetation) and reduced erosion following reestablishment of vegetation cover/habitat and natural contours.
Mining and logging activities	Long-term adverse effects on soils from erosion stemming from legacy surface disturbances and vegetation removal and long-term effects of acid mine drainage on wildlife and aquatic species.
Recreational use	Short- and long-term adverse effects on wildlife from visitor activities including trampling and associated compaction, noise and human disturbance, possible introduction of nonnative plant species.
Ranching, agricultural land uses	Short- and long-term adverse effects from operations that remove vegetation cover, compact soils, grazing pressure, and reduce habitat quality.

Past, Present, and Reasonably Foreseeable Activity	Impacts on Wildlife and Aquatic Species
Land development: residential and nonresidential (commercial, industrial) land uses, including road construction	Short- and long-term adverse effects on wildlife from direct loss of habitat in development footprint and compaction, erosion and sedimentation, habitat fragmentation, noise. Benefit from reestablishment of vegetation and habitat following construction-related disturbances.
Future oil and gas development on adjacent lands	Direct effects on wildlife from adjacent property and indirect adverse impacts on park resources from “spill-over effects” of erosion, sedimentation, and contamination from surface runoff; trends indicate that the exploration and production of shale gas, in particular, is anticipated to increase dramatically over the next 30 years.
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term adverse effects on wildlife from reclamation related disturbances due to use of equipment on site and grading. Long-term beneficial effects of restoration of natural contours, topsoil and vegetation cover that protects soils from erosion and improves habitat quality; removal of sources of contamination and contaminated soils and water to reduce impact on wildlife habitat.
Recovery actions against operators that damage park resources under 54 USC 100721	Long-term beneficial effects of cleanup of areas and recovery of natural resources that have been damaged from oil and gas spills that affected park lands and resources.
Industrial discharges to air and water from sources outside the park unit	Short- and long-term direct adverse effects on wildlife from discharges on adjacent property and indirect adverse impacts on park resources from “spill-over effects” of contamination.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 55 includes an accounting of cumulative impacts that could affect wildlife and aquatic species and special-status species in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 55. CUMULATIVE IMPACTS ON VEGETATION – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Grazing; agricultural activities; residential development; road building; irrigation; visitor activities within the park.	Damage, loss, and fragmentation of habitat in footprints of development would temporarily modify the existing wildlife community structure and composition in the project area, soil compaction and rutting; increased erosion and reduced habitat quality and use.
Big South Fork National River and Recreation Area	Actions include agricultural and forestry operations; commercial and residential development; road construction; existing and future coal mining operations; visitor use; prescribed fires; plugging and reclamation of abandoned wells including 39 under ARRA funded program.	Damage, loss, and fragmentation of habitat in footprints of development would temporarily modify the existing wildlife community structure and composition in the project area; soil compaction and rutting; increased erosion; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, which change soil chemistry and ultimately habitat quality and use, and mine tailings resulting in contaminated sediments and soils’ beneficial impacts from abandoned well plugging.

Wildlife and Aquatic Species (Including Animal Species of Special Management Concern)

Park Unit	Cumulative Actions	Description of Impacts
Big Thicket National Preserve	Actions include agricultural and forestry operations; urban and residential development; publicly owned facilities (water impoundments, water diversion structures, and sewage treatment); road construction; visitor use; plugging of abandoned wells under ARRA funded program.	Damage, loss, and fragmentation of habitat in footprints of development would temporarily modify the existing wildlife community structure and composition in the project area; soil compaction and rutting; increased erosion; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, which change soil chemistry and ultimately habitat quality and use; benefits from plugging of abandoned wells – site cleanup, grading and addition of soils, revegetation/reclamation.
Cumberland Gap National Historic Park	Park developments and visitor use; establishment of nearby State Parks; continued management of recommended wilderness in accordance with Wilderness Act and NPS policies; acquisition of Fern Lake and surrounding area.	Damage, loss, and fragmentation of habitat in footprints of development would temporarily modify the existing wildlife community structure and composition in the project area. Beneficial cumulative impacts from mine reclamation include reduced rates of erosion, compaction and surface disturbance through wilderness management and acquisition of additional vegetation and wildlife resources in the park.
Cuyahoga Valley National Park	Residential, commercial, and transportation related land development and construction outside the park; ongoing park operations and maintenance. Invasive and nonnative species management inside and outside of the park; land acquisitions and easements; deer management; agricultural use.	Damage, loss, and fragmentation of habitat in footprints of development would temporarily modify the existing wildlife community structure and composition in the project area, soil compaction and rutting; increased erosion; agricultural runoff, such as fertilizers and oil or herbicide use from vegetation management resulting in changed soil chemistry and reduced habitat quality and use; introduction and spread of nonnative species.
Gauley River National Recreation Area	Urban development. Transportation infrastructure improvements; mined land reclamation.	Damage, loss, and fragmentation of habitat in footprints of development would temporarily modify the existing wildlife community structure and composition in the project area, soil compaction and rutting; increased erosion and reduced habitat quality. Beneficial cumulative impacts from mine reclamation include improvements to wildlife through erosion control and revegetation.
Lake Meredith National Recreation Area	Actions include recreational activities; ranching and agriculture; residential development; road construction; water impoundments (i.e., Lake Meredith); recreational ORV use and other visitor use.	Damage, loss, and fragmentation of habitat in footprints of development would temporarily modify the existing wildlife community structure and composition in the project area; soil compaction and rutting; increased erosion; agricultural runoff, such as fertilizers and oil, and leachate from septic systems, which change soil chemistry and ultimately habitat quality and use, and increased erosion and sediment accumulation in surface waters, wetland and upland habitats.
New River Gorge National River	Urban development. Transportation infrastructure improvements; mined land reclamation.	Damage, loss, and fragmentation of habitat in footprints of development would temporarily modify the existing wildlife community structure and composition in the project area, soil compaction and rutting; increased erosion and reduced habitat quality. Beneficial cumulative impacts from mine reclamation include improvements to wildlife through erosion control and revegetation.
Obed Wild and Scenic River	Catastrophic release.	Contamination of soils and habitat from spill – oil and fire byproducts; damage and loss of wildlife and habitat and erosion of soils following fire.

Overall, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated operations would have a beneficial impact on wildlife and aquatic species in all category 1 and 2 park units, while exempt operations would cause adverse impacts stemming primarily from the current lack of regulation. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development occurring in the broader study area, the number of exempt wells involved, and the other cumulative actions affecting the resource in the entire study area.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in measurable impacts. Impacts on wildlife from permitted operations relating to loss or damage to wildlife or modification of certain types of wildlife habitat, site contamination, erosion and sedimentation, and introduction or spread of nonnative species would be as described for alternative A, no action.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations would not change the direct impacts of the footprint of well pads on wildlife; there would still be loss of habitat due to temporary vegetation removal and reestablishment of original vegetation within the footprint of previous disturbance. However, the change in regulation under alternative B would reduce indirect impacts and the risks of impacts on wildlife from oil and gas operations because of the implementation of better operating practices, resulting in long-term beneficial impacts on wildlife and habitat. Impacts on wildlife from site development and operation would be reduced as a result of implementation of the rule change because operations would need to meet the least damaging standard and other operating standards that are spelled out in the regulations.

The operating standards and mitigation that would now apply to previously exempt operations include removal of contaminated soils, effective erosion control, plugging and capping all nonproductive wells, maintaining areas of operations to avoid or minimize the cause of fire; recontouring and reestablishing native vegetative communities or provide for conditions where ecological processes typical of the ecological zone; controlling the invasion of exotic plant species; prevent or minimize all noise that adversely affects the soundscape, acoustic environment, or other park resources, and prompt and proper site reclamation. This would result in a reduction in overall damage or loss of wildlife communities. The proposed rules also require that operators use native soil material and grade to conform the contours to elevations that maximize ecological value. For those operations on private lands (previously access-exempt) where there is a reasonable chance of accidents affecting wildlife resources on federal lands, bringing these operations within the scope of the 9B regulations will allow park managers to take a proactive approach to protecting the federal interest by ensuring that operations inside the park unit are conducted in a manner that offers the highest possible protection to a park's resources and values.

As previously discussed, oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket

National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs including birding hot spots, bird rookeries, and natural areas in several of these park units. The permitting of future plans of operations within these park units would be subject to these SMA setback recommendations, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Looking at site-specific information available for the nine parks with previously exempt operations, under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority. Appendix G summarizes the special-status species known to occur or likely to occur at the parks with exempt operations. Based on available information and habitat preferences of species on or near the exempt well locations, only four park units are likely to support 12 special-status wildlife species. Lake Meredith National Recreation Area may support preferred habitat for the black-footed ferret, interior least tern, lesser prairie chicken, and northern Aplomado falcon. One well site within Big Thicket National Preserve may contain preferred habitat for the red-cockaded woodpecker. Cuyahoga Valley National Park may contain preferred habitat for Indiana bat, northern long-eared bat, bald eagle, Henslow's sparrow, and cerulean warbler. Gauley River National Recreation Area may likely support the Virginia big-eared bat, Indiana bat, and Diana fritillary.

Surveys may need to be completed at the well locations of existing exempt operations to assess whether or not federal or state listed animal species inhabit or frequent these sites, or are living adjacent to the sites where they could be disturbed by noise or emissions or contamination. Appropriate mitigation would need to be identified and required to protect any species that are being adversely affected. Some areas that would be of concern include bat roosts or hibernaria in nearby trees, nesting birds, or the presence of listed fish or mussels in downstream waters that are subject to site runoff. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. A survey would likely be required to determine whether specific stipulations related to the timing of operations would be needed in order to mitigate impacts on wildlife and aquatic species. As a result, beneficial effects would occur to wildlife through requirements to adhere to these standards and measures. Information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting park resources, including wildlife and aquatic species and special-status species.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B, impacts on wildlife and aquatic species and special-status species would be the same as described under alternative A.

Financial Assurance

Impacts affecting wildlife, such as habitat loss, soil erosion, and contamination, would be remediated in a more timely manner with the enhanced financial assurance requirements under alternative B. Impacts on wildlife from seismic operations are not generally tied to inadequate bond amounts, so this provision would not have much of an impact on this specific phase of oil and gas development. However, adequate bonding for drilling and production phases would provide funds for the NPS to reclaim sites sooner in the event of an operator default. This would result in a beneficial change to impacts on wildlife and aquatic species and special-status species compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. This would reduce the risk that the NPS would suffer unnecessary loss of use and potential adverse impacts on wildlife and aquatic species and special-status species because reclamation may be accelerated compared to the existing condition.

Enforcement and Penalties

Under alternative B, the new penalty provision that would be established would provide incentives for an operator to comply with the 9B regulations. That would, in turn, facilitate protection of park resources and values, including wildlife and aquatic species and special-status species, resulting in a long-term indirect beneficial impact compared to the existing condition.

Compensation for Access across Federally Owned Land

Under alternative B, beneficial impacts on wildlife may result from compensatory reclamation activities that may be done in lieu of an access fee. These activities would involve restoration of disturbed areas, including legacy oil and gas sites, to natural conditions. Over the long term, beneficial impacts on wildlife and aquatic species and special-status species would accrue from such reclamation measures employed under alternative B, compared to the existing condition.

Cost Recovery

Under alternative B, increased monitoring and evaluation of operations that could be funded by permit application fees would allow for NPS to detect potential problems such as spills and releases, nonnative species establishment, and restoration of habitat, and ensure operational compliance, thereby mitigating potential impacts on many resources including wildlife and aquatic species and special-status species. Although permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to wildlife to the extent these funds were applied to increased monitoring and evaluation of operations. As a result, under alternative B, cost recovery could have a beneficial impact on these resources compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, both adverse and beneficial cumulative impacts would occur from projects, plans and actions and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on wildlife and aquatic species and special-status species, as described in the above analysis. Bringing previously exempt operations under regulation would add substantial beneficial impacts on wildlife. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on wildlife and aquatic species and special-status species from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on wildlife and aquatic species and special-status species at the site-specific level of analysis.

Directional Drilling

The regulation of directionally drilled wells under alternative C would result in both direct and indirect beneficial effects to wildlife and aquatic species and special-status species beyond park boundaries either by application of NPS operating standards on operations located outside the unit, or by operators choosing a surface location inside the park boundary.

However, the application of regulations on surface and subsurface operations located outside of NPS boundaries may potentially remove a key incentive for operators to locate operations outside of park units. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed (O’Dell pers. comm. 2013d) (see the “Socioeconomics” section). As a result of the changes in alternative C, operators may be more likely to select locations within park unit boundaries, thereby intensifying direct impacts on park resources, including wildlife. If surface locations are sited within the park unit boundaries, adverse effects on park wildlife would include those impacts previously described under “Typical Impacts of Oil and Gas Operations on Wildlife and Aquatic Species” and include loss or disruption of habitat due to vegetation and site clearing, habitat fragmentation, possible injury to or mortality of less mobile species, noise and associated species displacement or stress, and spills or releases of harmful substances related to exploration and production activities that would be associated with wells. However, under NPS regulation of directionally drilled wells, animal species of special concern would be avoided, or mitigation would be required to reduce or eliminate adverse impacts to those species. This could reduce adverse impacts to those species that would not have been afforded protection on private property outside park boundaries without NPS regulation and would be a beneficial impact on species of special concern.

Therefore, alternative C could create additional long-term direct adverse impacts to wildlife and special-status species within park units compared to the existing condition. However, a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, would facilitate protection of park resources and values, including wildlife and aquatic species and special-status species, resulting in a long-term indirect beneficial impact on wildlife.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, there would also be effects on wildlife and aquatic species and special-status species that would occur as a result oil and gas operations that would continue to affect wildlife and associated habitat where impacts cannot be avoided, and benefits from bringing previously exempt operations under regulations and the resultant reduction in adverse impacts, as described in the alternative B analysis. Alternative C would contribute to cumulative impacts mostly by adding beneficial impacts of bringing previously exempt operations under regulation, but also by possibly adding adverse impacts from the change in directional drilling regulations that could result in more oil and gas development within park units as opposed to outside park boundaries. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on wildlife and aquatic species and special-status species from the existing condition. Continuing impacts on wildlife and aquatic species and special-status species from regulated and exempt operations would be expected. Impacts would be as described in the analysis, with an increased risk of more severe or extensive adverse impacts on access-exempt or grandfathered sites unless those sited changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations would result in impacts such as loss or disruption of habitat due to vegetation and site clearing, habitat fragmentation, possible injury to or mortality of less mobile species, noise and associated species displacement or stress, and spills or releases of harmful substances. As a result, there would be continuing impacts from ongoing oil and gas activities occurring within the park units. Plugging and reclamation of wells would result in long-term beneficial impacts on wildlife and aquatic species as a result of reclaiming the well pads and access roads of well sites. The long-term effect of these activities would be to return the area to natural conditions, which would have a beneficial impact on wildlife and aquatic species and special-status species. Impacts on wildlife and aquatic species and special-status species in the park units from directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have indirect effects on resources, including wildlife and aquatic species and special-status species, due to delays in reclamation or possible lack of funding or enforcement. Because the adverse effects under alternative A would be generally localized, would not result in widespread harm to or degradation of park wildlife, would be mitigated by setbacks and site reclamation, and because consultation requirements would protect special-status animals, these impacts would not be significant.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on wildlife and aquatic species and special-status species in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects would accrue from the continued unregulated operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term indirect beneficial impacts on wildlife and aquatic species and special-status species, compared to the existing condition. Benefits would accrue primarily from reduced risk to wildlife due to previously exempt operations being subject to the least damaging standard as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would be very limited in extent compared to the entire park area, and mitigation measures, stipulations, or consultation requirements would reduce harm or loss of wildlife and protect special status species, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations. Adverse impacts of oil and gas development would be localized, subject to regulatory review, and limited and would not be significant.

Alternative C

Under alternative C, when compared to the existing condition, impacts of the regulatory changes would also be primarily beneficial, as described for alternative B. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells (operations located wholly on non-federally owned lands but still within the boundary of a park unit) not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on wildlife and aquatic species especially to animal species of special management concern, because NPS standards would apply both inside and outside the parks. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts such as loss or disruption of habitat, habitat fragmentation, possible injury to or mortality of less mobile species, noise-related displacement or stress, and exposure to spills or releases of harmful substances within park boundaries to wildlife in general following the removal of regulatory incentives to locate operations outside of the park units, although special-status species would be protected through consultation. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to wildlife within park units compared to the existing condition, although these impacts would be localized and small in number. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Because

alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would be limited in extent compared to the entire park area, and mitigation measures, stipulations, or consultation requirements would reduce harm or loss of wildlife and protect special status species, the impacts of this alternative would not be significant.

Both adverse and beneficial cumulative impacts would accrue from projects, plans, and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial. Adverse impacts of oil and gas development would be localized, subject to regulatory review, and limited, and would not be significant.

VISITOR USE AND EXPERIENCE

METHODOLOGY

Potential impacts on visitor use and experience are assessed based on the actions being proposed and the various visitor use and experiences available at the NPS parks, with attention to characteristics such as health and safety, noise, visibility, and access that may affect visitor use and experience. Topic-specific context for assessing impacts of the alternatives to visitor use and experience includes the following:

- the type of visitor experience desired (as noted in chapter 3, parks are visited by people desiring a range of uses and experiences, from passive or casual use, to very active use and backcountry experiences)
- the proximity of the areas used by visitors to oil and gas operations (this can especially affect noise and visual impacts, which are addressed in more detail under separate topics)
- the particular health and safety issues related to oil and gas operations, including exposure to oils, gases, and other hazardous chemicals that are used in oil and gas exploration and development

For site-specific analysis, locations of the well pads of exempt operations were mapped relative to visitor use areas (e.g., visitor centers, picnic areas, campgrounds, trails, etc.) if this information was available in the parks' geospatial databases to assess impacts of those operations.

IMPACTS OF ALTERNATIVE A: NO ACTION

Typical Impacts of Oil and Gas Operations on Visitor Use and Experience

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on visitor use and experience result primarily from the presence of seismic survey crews and equipment in and around the park, and the detonation of explosives. The following describes typical impacts that can occur.

Access—Seismic operations may preclude use of the survey areas including some park roads by park visitors while survey crews are working. Access limitations would be temporary because most surveys last a few weeks to a few months and affect only certain areas of the parks at one time. For example, visitor access and seismic activity creates a use conflict during hunting seasons or times of prime bird watching.

Scenic Views—During geophysical operations, the presence of oil and gas personnel and their vehicles and equipment could cause adverse visual impacts for visitors that are seeking a park-like or natural experience. Flagging used to mark site lines can be distracting, and the cutting of survey lines through dense vegetation can require creation of paths for vehicles and crews and clear a line of sight that is not natural.

Noise—The noise associated with seismic surveys would occur from the use of vehicles, crews, and Vibroseis® trucks. Chainsaws are often used to clear a survey line of sight, and helicopters may be used to transport equipment. Noise generated by these seismic survey activities would be intermittent and typically occurs over a period of 3 weeks to 3 months. Helicopters, when used, are the primary noise source in seismic operations. Often two or more helicopters are used to support a seismic shoot. In these cases, the noise would be continuous during daytime operations, but limited to a 2- to 3-week timeframe within the active area of operations.

Health and Safety—Seismic surveys can introduce some health and safety concerns by exposing park visitors to hazards associated with increased vehicular traffic and safety hazards to crews working with explosives. Visitor access is limited to areas to reduce the possibility of encounters.

Overall, given the short duration (weeks to a few months) of seismic surveys, the majority of impacts associated with geophysical surveys would be limited in extent.

Impacts of Well Drilling and Production

Access—the primary effect of well drilling and production is a reduction in access to any well pads and associated production facilities or access roads. All drilling and production operations would be closed to visitor access. Due to safety concerns, there may be additional restrictions to visitor access immediately adjacent to these sites. Indirect impacts, such as increased traffic, noise, dust, odors, night lighting, and human activity, would not necessarily preclude recreational access, but would decrease the quality of the visitor experience in the vicinity of the operation, especially in more remote portions of the parks. Workovers and servicing of existing operations could also cause access delays or restrictions.

Scenic Views—Visual impacts on visitor experience from drilling and production operations could be more substantial than other types of impacts on visitors, especially if well pads were placed in relatively undisturbed or popular settings where visitors would be readily able to see the operation and all associated equipment and tanks, and visitors to that area were expecting or desiring a more natural experience. Drill rigs can reach heights of 180 feet, which would most likely be visible from several locations within the parks. Initial site clearing would remove approximately 1.5 to 4 acres of vegetation for each well pad (SHIP 2013), and access road construction would often result in visible cuts through park vegetation or creation of a definitive pathway, depending on the location and park. The operations, especially drilling, would increase the presence of work crews and equipment. Since drilling is a 24-hour, 7-day a week operation, these impacts would be continuous, and could last a week or two up to a few months. Hydraulic fracturing operations, although rare in parks, would require a few more weeks for completion. Lighting of the drilling rig could interfere with visitors' night-sky views, depending on where the operations are sited and the design and installation of the lighting. Production operations, although having a less intrusive human presence compared to drilling, could be visible for 20 years or longer. Please see the scenic views and night sky resources topic for more details on this aspect of visitor experience.

Coming across an oil drilling or production rig could be an unpleasant experience for visitors seeking a natural, outdoor experience. The visual presence of oil and gas operations in a natural setting could adversely impact the areas by displacing the visitor or lessening the quality of the visitor experience. In other circumstances where visitors are passing through parks and not focused on the natural setting, these

impacts would not be as pronounced. The impacts would be less for those visitors who are less concerned with the presence of such operations, and where operations are naturally screened from view.

Noise—As discussed in more detail under the “Natural Soundscapes and Acoustic Environment” topic, there would be increased noise from construction activities (vehicles, chainsaws, and earthmoving equipment), drilling rigs, and the drilling or workover crew that could adversely affect human health, visitor use and experience, wildlife, and the overall acoustic environment. Operations involving hydraulic fracturing would result in greater truck traffic and associated vehicular noise, which could cause temporary disturbance to visitors using the same roadways in the park or areas located near these operations, and could last an additional 2 to 4 weeks compared to regular drilling operations. These noises would be different from the types of noises common in the visitor use areas, or general background noises elsewhere in the park. As noted in the “Natural Soundscapes and Acoustic Environment” section, noise from a typical rotary drilling rig is estimated to be approximately 63 dBA at a distance of 200 feet. Noise impacts would be unavoidable if they were close enough to a visitor use area to cause interference with the enjoyment or use of the area, and would conflict with a variety of park goals. In parks where operations are located close to active recreation (e.g., motor boating), the noise associated with the oil and gas operations would not be as noticeable.

Noise from exploration, development, and extraction activities can be mitigated through a variety of ways including, but not limited to, use of quieter engines, quieter machinery, noise barriers, noise enclosures, and timing of operations to avoid the quietest times of day or certain seasons for which impacts would be greater (i.e., nesting season for sage grouse).

Production operations would also cause impacts because of the noise associated with production equipment and the short-term use of loud machinery and workover rigs on site. These impacts would result from high sound levels while being temporary in nature. However, most noise levels associated with production would have lower sound levels than those generated by a drilling operation, yet would be continuous and could have other impacts to the soundscape, acoustic environment or the wildlife that rely on natural acoustic conditions.

Odors / Health and Safety—The primary source of odors would be from drilling or production operations, especially if spills or leaks occurred and oil or other chemicals were not quickly cleaned up and removed from the site. Drilling and production have the potential for well blowouts and releases of hydrocarbons or other hazardous substances, including drilling muds and gases such as hydrogen sulfide (H₂S). Pumpjacks with automatic timers are also a safety hazard, as they can be activated at any moment. Visitors could also be drawn to well pads and sites out of curiosity, resulting in potential exposure to dangerous equipment or stored chemicals. Hunters, in particular, need to keep a safe distance from oil and gas operations; there is an inherent hazard of shooting near drilling rigs and production facilities (i.e., storage tanks, wellheads, and pumpjacks) where bullets could penetrate equipment or cause ignition of flammables. There is the possibility of storm damage to drilling and production operations, which could spread hazardous and contaminating substances. Perforating or rupturing a storage tank containing oil or treatment chemicals at a production facility would increase the threat of spills and subsequent harm to the public if they were to venture onto the site.

A potential impact on human health and safety is the potential exposure to hazardous substances. Materials stored at well sites include oils, chemicals, and lubricants. Also, gas wells can release hydrogen sulfide gas. If well sites are not fenced and are open to the public, there is a chance of visitor exposure to these substances if visitors enter the unsecured site. Most wells would operate under an emergency response plan that would address hydrogen sulfide releases and other possible scenarios. For those wells that may emit hydrogen sulfide, a radius-of-exposure analysis would likely be performed prior to site selection. However, the NPS recognizes that unplanned incidents associated with oil and gas operations

such as well blowouts, fires, and major spills within the boundaries of the park present a risk of release of contaminants that can adversely impact visitor use and experience by actual exposure to chemicals or from lack of access following an incident, depending on the location of the release.

For directionally drilled wells, the location of these wells outside the park boundary means that most of the impacts addressed above would not be experienced by visitors in the park. However, if these wells are close enough to the park boundary, noise and even lighting can carry into the park, and effects could be similar to those described for operations inside the park units. However, the intensity of impacts would vary with the location of the well. Impacts on park visitors could also occur if operations bordering the parks but visible to visitors created unsightly and/or unnatural conditions. Severity of impacts would depend on proximity of operations to the park units; site specific environmental conditions, such as topography and vegetative cover that would provide natural screening; and mitigation measures being employed.

Impacts of Plugging and Reclamation

Access—Plugging and reclamation operations would have public access impacts similar to those described for drilling and production, but would be limited in duration to the time needed to plug and reclaim each operations site. Reclamation operations would not interfere substantially with visitor access, and when completed, would restore access to areas previously off-limits to visitors.

Scenic Views—The presence of heavy equipment and a service rig associated with plugging and reclamation activities would have similar impacts on scenic views and night sky resources as described for drilling and production operations. However, plugging and reclamation would end disturbances from production activities, and the sites would be restored to a more natural character, although some roads may be left in place for future use. Reclamation of the well pads following plugging of the wells would serve to eliminate the unnatural views of the site over time. The actual time required to reclaim the site's scenic views would depend on many factors, including the erosion potential of the site, productivity of the vegetation, topography, and soil characteristics, including the presence of any contamination. Artificial lighting would be removed and flaring activities would cease. Ultimately, the removal of the rig and associated structures and equipment, in conjunction with site reclamation, would improve the scenic views near the well sites. The effects on visitor experience would range from a beneficial effect of having a natural setting restored, to essentially no effect on visitors for those wells in areas far from visitor uses or in locations where visitors have not been bothered by the presence of the wells.

Noise—The operations involved in site closure would cause temporary increases in noise from earthmoving, demolition, and other equipment, as described for drilling and production. However, when closure and reclamation are completed, noise levels would return to ambient levels similar to those before the installation of the oil and gas operation and would have overall beneficial impacts to the soundscape and acoustic environment.

Odors / Health and Safety—There could be odors during plugging and reclamation operations from heavy-equipment exhaust and emanating from leaks and spills. Once plugging and reclamation is complete, plugging and reclamation of wells would remove threats associated with exposure to hazardous wellhead equipment, ignition of flammable gases, possible flowline ruptures, and ingestion, inhalation, or absorption of spilled or released hydrocarbons, contaminants, or hazardous substances and remove a risk to visitor health and safety.

Regulated Operations (Current and Future)

Current data indicate that there are 215 wells under plans of operation in the category 1 park units. The historic average of new drilling operations is about 4 proposals per year (NPS 2013). Therefore, approximately 80 to 120 new wells may be drilled and produced in the parks over the next 20 to 30 years. Impacts on visitor use and experience from ongoing or future permitted oil and gas production operations include those described above under “Typical Impacts of Oil and Gas Operations on Visitor Use and Experience.” The primary effects on visitor use and experience from oil and gas operations are from the presence of the operations and work crews that cause visual and noise disturbances to the natural environment of the parks. There are also health and safety concerns with the presence of hazardous substances at the sites.

Under alternative A, regulated operations are subject to the 9B regulations, which require that operating standards be met. Current operating standards and mitigation included with permitted wells require a 500-foot setback for visitor use areas and siting the well pads so they are screened from view by vegetation and topography if possible. The 500-foot setback required for visitor use and administrative areas under the 9B regulations would result in reducing the adverse impacts from drilling rig noise and odors, but areas close to the wells would still experience some of these impacts.

Current regulations also require precautions in areas where high pressures are likely to exist, control of “wild” wells, proper handling of wastes, and conduct of operations in a “safe and workmanlike manner (see current 36 CFR 9.41). Under current regulations, all potentially hazardous materials would be kept in completely enclosed storage containers. Spill-prevention and control measures and other contingency plans included would provide for protective measures to minimize accidental discharges of hydrocarbons and produced water including containment within the operations area, in the event of storms, equipment failure, or operator error. In general, the required setbacks between oil and gas sites and visitor use areas would help to limit visitors seeing and going near these facilities. Other mitigation measures include the use of warning signs and notices, security guards (during active drilling), secondary containment (liners and berms), and fencing around the pad and all associated tanks and equipment. In instances where it is required in order to safeguard human health and safety, and as may be necessary to protect park resources, the park superintendent will restrict public access on any roads constructed and used exclusively for accessing oil and gas operations. Finally, timing conditions are often applied to approved operations to minimize conflicts with visitors. Timing restrictions can be implemented on a daily, weekly, or seasonal basis depending on the operation and the nature of the visitor use. For example, drilling might be conducted during winter months when visitation to a park is low.

Oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, including some that were designated to protect visitor use and experience. For example, a no surface use stipulation and a 500-foot setback for geophysical exploration and a 1,500-foot setback for drilling and production are established for “Visitor Use and Administrative Areas SMAs” at Big South Fork National River and Recreation Area under the oil and gas management plan framework unless other mitigation that protects SMA resources and values is included and authorized in an approved plan of operations. Additionally, all operations would be limited during high visitor use or visitation periods (generally April through October) (NPS 2012b). Under the Big Thicket National Preserve oil and gas management plan, the “Visitor Use, Administrative and Other Use Areas SMA” includes 26 day use areas, 9 trails, multiple canoe routes and administrative areas, 3 cemeteries, and 2 private residential sites. There is a 500-foot offset for geophysical operations and a 1500-foot offset for drilling and production operations from these areas. The plan also includes SMAs for 8 birding hot spots (with similar offsets) and 5 hunting areas (NPS 2005). Under the oil and gas

management plan for Lake Meredith National Recreation Area, a “No Surface Use” stipulation, in which case new non-federal oil and gas operations would not be permitted, would apply to several “Visitor Use and Administrative Areas SMAs,” including the following: 2 information stations located in the parks; 16 day and overnight use areas; 2 trails; 1 Canadian River Municipal Water Authority administrative area and 2 park administrative areas that also serve as information stations; all of these have a 500- to 1,500-foot setback depending on the mitigation measures used. Also identified is Sanford Dam, with a 1,000-foot setback from the toe of the dam; and the surge tower and aqueduct, with a 200-foot corridor (NPS 2002b). At Padre Island National Seashore, the oil and gas management plan identifies several sensitive resource areas totaling 1,168 acres to be closed to surface access associated with non-federal oil and gas operations, including: the Malaquite Visitor Center and RV Campground, Bird Island Basin, and the Grasslands Nature Trail (NPS 2000b). The permitting of future plans of operations within these park units would be subject to these SMA setbacks or other restrictions, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

All of these measures would protect the public from exposure to hazardous materials and help keep the site in a condition that would not be a visual eyesore. In addition, under the current approval process for plans of operation, the NPS requires that operators meet the least damaging standard, which includes using the appropriate mitigation measures as recommended in the NPS Operators Handbook (NPS 2006b). Typical mitigation measures that minimize impacts on visitor use and experience include removal of contaminated soils, effective erosion control, proper secondary containment around storage tanks, regular pump jack maintenance, and removal of debris, waste, and equipment no longer needed in operations. Flowlines must be sited to minimize additional land disturbances that would be visible to the public. Drilling and production equipment may be painted to blend in with the surrounding environment. Sites are to be kept clean and orderly, and any spills should be promptly cleaned up and removed from the operations site. Lighting should be done so as to minimize the effects on night sky that would adversely affect visitor experience in the immediate area. Methods to minimize effects on night sky resources include, but are not limited to, shielding, directing, using timers and motion sensors, using lower lumen fixtures, and only installing lights where human activity at night warrant it. The implementation of these measures would reduce the extent or intensity of impacts on visitors viewing the operations or using the areas around them that were previously described under typical impacts of oil and gas operations. Remaining impacts would be limited to short periods of noise and possible access limits that may affect the extent of visitor use in the vicinity of operations, and longer-term impacts on visitor experience such as the sight of industrial operations in a natural setting, but the measures to screen or minimize the visual intrusion would minimize that impact.

Precautions would also be taken to prevent well blowouts and the sudden accidental release of H₂S during drilling operations. A blowout could release, drilling fluids, formation waters, oil, or natural gas under pressure, and H₂S and other gases which could spread some distance from the well site. Fires, if spreading out of control, could present short-term health and safety issues while ongoing, and substantial impacts on visitor access or use of affected areas in the aftermath. Preventing blowouts during drilling operations can be accomplished by hiring experienced drilling personnel, following required operating stipulations, and implementing mitigation measures that address high-pressure precautions. These measures include proper design and use of drilling muds, constant monitoring of the characteristics and volume of drilling mud to manage drilling conditions, and proper casing and cementing. Wells must be equipped with blowout preventers, which are tested periodically and can be used to shut in the well if needed.

Impacts on visitor use and experience from currently regulated and future operations also include the effects of geophysical (seismic) surveys that are conducted within the category 1 park units and may be conducted in category 2 park units. Since 1998, 20 seismic surveys have been conducted in 6 parks for an average of 1.4 surveys per year. All but one have been 3-dimensional seismic surveys covering large

geographic areas. Going forward, the level of seismic activity is expected to taper off to about one proposed survey per year (NPS 2013). Impacts of these surveys include those described above under “Typical Impacts of Oil and Gas Operations on Visitor Use and Experience.” The exact extent of the surveys would vary from operation to operation. However, under the current process for approval of seismic operations, mitigation measures that would minimize visual impacts include a 500-foot setback from waterways and other visitor use areas; removing trash and debris; and removing flagging after surveys are completed. Warning signs would be posted and notices placed in the park and the local newspaper about the operations. All generated wastes are to be cleaned up and disposed of promptly. The seismic survey would have emergency response plans in place in order for their plan of operations to be approved. Operations would need to meet the least damaging standard so ground disturbance would be kept to a minimum. Scheduling operations outside of peak visitation periods could also minimize impacts on visitor access and are included as conditions of permit approval where needed.

When current operations end and wells are plugged and sites are reclaimed, impacts on visitor use and experience would be as described under “Typical Impacts of Oil and Gas Operations on Visitor Use and Experience.” Current projections are that about 4 existing wells per year would be plugged and reclaimed (NPS 2013). Provisions in the current regulations and approval process for well plugging ensure that sites are reclaimed properly and left in a clean and safe condition, including disposing of waste materials outside of the park, and employing erosion control measures on the access road and well site. Well plugging and surface reclamation would result in the sites being restored to natural contours and revegetated, the wells properly plugged, and all equipment and wastes removed. Although earth moving equipment and crews create noise, dust, and limit access during plugging actions, these disturbances are temporary. There are mainly beneficial effects on visitor use and experience once cleanup is successfully completed and the site is reclaimed to natural conditions. Beneficial impacts of plugging and reclamation are realized in the short term and over the long term as site vegetation becomes reestablished.

Currently Exempt Operations

Under the no-action alternative, existing and future “access-exempt” operations and existing grandfathered operations would also result in impacts on visitor use and experience. These impacts are often more extensive or more severe compared to impacts that occur from regulated operations because exempt operations are not subject to NPS operating standards and mitigation measures that would serve to remove or reduce impacts.

The following discussion provides more site-specific detail of the current and potential impacts on visitor use and experience from activities associated with these currently exempt operations. Currently there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. Impacts on visitor use and experience from ongoing exempt operations include those described above under “Typical Impacts of Oil and Gas Operations on Visitor Use and Experience.” However, because these operations are not fully regulated, there is a higher level of risk of impacts from the proximity of wells to visitor use areas, possible continuous but minor leaks of hazardous substances, lack of erosion control, or screening requirements that all cause more visual disturbances to the landscape. Similar to regulated operations, the primary effects on visitor use and experience from exempt oil and gas operations stem from the visual intrusion of an industrial use in a park setting, which degrades the experience of those visitors seeking a natural park experience. There are also periodic loud noises and potential risks associated with the presence of pressurized or moving equipment, flammable fluids, hazardous air conditions, and exposure to contamination. These impacts would last until reclamation is complete. Both grandfathered and access-exempt operations would present similar impacts, although the access-exempt operations may be better secured from visitors because they are on private property, which may be fenced or otherwise secured and not as accessible as the surrounding national park lands.

Exempt operations have the potential for continuing adverse impacts from the possible exposure to wastes and hazardous substances. As noted in the “Geology and Soils” topic in this EIS, NPS inventory data has documented many instances of soil contamination and erosion on grandfathered sites that do not rise to the level of warranting suspension. Poor operating practices at these sites sometimes leads to spills, leaks and other releases of oils, produced water, or other chemicals on site. Releases of oils or chemicals have contaminated soils at several exempt wells and have not been cleaned up because of lack of regulation and associated oversight. Inspection reports reveal several wells with leaking wellheads, stained soils, leaking tanks, and odors (see appendix D). Adverse impacts on visitor use can result from instances of site contamination at exempt wells whereby visitors accessing the site can be exposed through touch or inhalation, and the impact of spills and odors has an adverse impact on visitor experience. Under the no-action alternative, issues of contamination occurring at sites of exempt operations are expected to continue or to be cleaned up at the discretion of the operator, resulting in a continued potential for long-term adverse impacts on visitor experience if the contamination is not remediated in a timely manner. For access-exempt operations, impacts on visitor use and experience would be similar but less likely because the wells are sited on private lands, although spills and unkempt sites can still affect visitors that are passing nearby. The NPS expects that perhaps 20 percent of the 78 wells in this class might require action to mitigate impacts, based on proximity to federal lands.

In addition to the potential for health and safety impacts, exempt operations also have impacts due to their locations near visitor use areas, where they can be more easily seen and heard. Table 56 presents site-specific information regarding proximity of exempt operations to visitor use areas (based on geospatial analysis of information obtained from the parks). There are currently 319 exempt operations in category 1 park units, 43 of which occur within 500 feet of visitor use areas.

TABLE 56. EXEMPT-STATUS WELLS LOCATED WITHIN 500 FEET OF VISITOR USE AREAS MAPPED BY THE PARKS

Park Unit	Number of Exempt Operations	Number of Operations Located within 500 feet of Visitor use Areas
Aztec Ruins National Monument	1	0
Big South Fork National River and Recreation Area	152	1 ^a
Big Thicket National Preserve	2	0
Cumberland Gap National Historical Park	2	0
Cuyahoga Valley National Park	87	40
Gauley River National Recreation Area	28	0
Lake Meredith National Recreation Area	41	0 ^b
New River Gorge National River	1	0
Obed Wild and Scenic River	5	2

^a The figure for Big South Fork and other parks is from maps with specific visitor uses plotted and does not capture all wells that are within 500 feet of areas used by visitors especially rivers and trails. As noted in the Big South Fork oil and gas management plan (NPS 2012b), many oil and gas access roads are also used for recreational trails and drill rigs may be visible from several areas of the park including boats on the rivers.

^b Figure for Lake Meredith does not account for proximity to the nearby lake. It should be noted that exempt operations are visible from the lake and from access roads leading to the lake shoreline.

Visitor use areas within a 500-foot distance of exempt wells include trails, campgrounds, visitor centers, and other areas designated for visitor use such as scenic overlooks and interpretive sites. Not all areas used by visitors were included in each park’s database, so the figures underestimate the potential impacts

on visitor experience of hearing and seeing oil and gas operations. At Cuyahoga Valley, there are quite a few visitor use areas within 500 feet of exempt operations. These include 29 buildings that are not specifically identified in the park's database, 1 monument, and 10 trails or connector routes (see appendix C).

Directional Drilling

Under the no-action alternative, the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units provides long-term beneficial impacts on park resources enjoyed by visitors and the visitors themselves by the removal of the potential risk for direct impacts on resources occurring within the park unit and by displacing a source of noise and visual intrusion to a location outside the park. However, wells directionally drilled and produced from outside park units to bottomholes beneath the park units could still impact visitors that are located near the park boundary, and under the 9B regulations, the NPS cannot require preventative mitigation even if such operations may indirectly affect park resources by their proximity to the park. For example, the noise from a drill rig located at the park boundary could carry into the park for 200 feet before reducing to the level of normal conversational speech (approximately 60 dBA) and would need a distance of 3,200 feet before it was reduced to a level approximately equivalent to background ambient sound levels at some park units (roughly 40 dBA and below) (see "Soundscapes and Acoustic Environment"). The distance a sound travels depends on its amplitude and frequency. Low frequency sounds like those from transportation and mechanical sources travel much farther than higher frequency sounds like whistles or bird calls. The NPS requires the mitigation of noise and the protection of soundscapes. A suite of methods should be used, such as retrofitting equipment, installing sound enclosures, sound barriers, and timing loud activities. The NPS Natural Sounds and Night Skies Division guidance documents on how to protect soundscapes should be used. Impacts could also occur from soil erosion and runoff that can reach park resources that are viewed by the public, and the risk and intensity of impacts would increase for operations sited closer to park boundaries where water and sediment can be transported downslope into park units through streams, gullies, or overland flow. Intensity of impacts would depend on proximity of operations to the park units; site specific environmental conditions, such as steepness and direction of slope and surface hydrology; and mitigation measures being employed.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limit, it is likely that many sites would have insufficient bonding for reclamation. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, remediation of well sites could be delayed indefinitely. Until well plugging and surface reclamation is completed, there would be potential adverse impacts on visitor use and experience at some well locations and in some parks because of the continued presence and visual intrusion of these operations and possible safety concerns if there is contamination, debris, or unsecured or leaking equipment on site. Other wells that are not in high visitor use areas and/or have no safety issues could have a delayed reclamation due to limits on bonding, and there would be slight impacts, if any at all, to visitor use and experience. There are also instances where the current bonding is adequate to reclaim sites to the point of reducing impacts on visitors by providing for grading and revegetation, and the current financial assurance limits would have essentially little or no impact on visitor use and experience. Because performance bond amounts rarely approach \$200,000 for seismic operations, impacts on visitor use and experience from these operations are not generally tied to inadequate bond amounts. However, delayed reclamation for some operations could result in unnecessary adverse impacts on visitor use and experience, and health and safety, as described above that could become long-term adverse impacts.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations, impacts on visitor use and experience could result from leaks or spills that could occur with no financial assurance to cover the cost of cleanup if there is no performance bond in place. Leaks or spills would be unsightly, possibly cause odors, and present a safety hazard. If the new owner defaults before posting financial assurance, the NPS would need to seek and acquire funding for cleanup or reclamation. Reclamation could be delayed indefinitely. Over the interim period, there would be loss of use of these areas, and the potential adverse impacts on visitor use and experience would continue until they were properly mitigated.

Enforcement and Penalties

Under the no-action alternative, the absence of penalties for minor acts of noncompliance would result in the continued lack of incentive for operators to fully comply with NPS operating standards. This could result in higher incidents of contamination from spills and increased site erosion. These conditions would be unsightly, possibly cause odors to persist, and present a safety risk due to the potential for exposure to visitors.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages and any associated loss of use of the roadways that result from privileged use of federal surface estate.

Cost Recovery

Under the no-action alternative, the lack of cost recovery could have an indirect adverse impact on visitor use and experience because additional money collected to support NPS permitting, monitoring, and compliance programs could be used to enhance resource protection. While permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to visitor use and experience to the extent these funds were applied to increased monitoring and evaluation of operations. Overall, however, funds received by the parks are directed toward a variety of activities, and the results of general improvements in conditions in the park do not necessarily extend to perceptible improvements in visitor experience. Therefore, the nonrecovery of costs under the no-action alternative would result in minimal adverse impacts on visitor use and experience.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect visitor use and experience in the parks. Management planning actions, can result in greater protection for park resources that are the basis for much of the parks' visitor use and experience. Conversely, actions that cause disturbance of these resources, such as are listed in table 57, can adversely affect visitor use or experience. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on visitor use and experience in the area of analysis and a brief summary of the cumulative impacts of these actions on visitor use and experience are listed in tables 57 and 58.

TABLE 57. CUMULATIVE IMPACTS ON VISITOR USE AND EXPERIENCE (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Visitor use and Experience
Prescribed fires and fire management actions	Short-term and long-term adverse effects from loss of access to certain areas during burns, reduction in visibility from smoke, reduction in air quality/presence of strong odors from smoke and fires; visible burned areas detract from visitor experience. Long-term beneficial effects of reduced fire occurrences with managed burns that reduce the possibility of catastrophic and high intensity fire that can affect visitor safety and continued use of the parks.
NPS facility and road construction	Short-term adverse effects on visitor use from loss of access, noise, and visible disturbance during construction, but long term benefits from addition of visitor use facilities and roads.
Vegetation management	Short-term disturbance from presence of vegetation management crews (possible access disruption, noise, chemical use, odors); long-term beneficial effects of improved vegetative cover (improvement in the visible landscape).
Trails development and maintenance	Short-term adverse effects on visitor use from loss of access, noise, and visible disturbance during construction or maintenance, but long term benefits from addition of trails and improvement of condition.
ORV use	Short- and long-term disturbances to some visitor uses where the noise and presence of ORVs is disturbing, also visible damage to soils, vegetation; benefits to those visitors desiring this type of recreation where permitted.
Abandoned mine lands reclamation	Short-term adverse effects on visitors from lack of access to areas during reclamation. Long-term beneficial effects of addition of safety features and signage following reestablishment of vegetation cover and natural contours and closure of mine shafts.
Future oil and gas development on adjacent lands	Indirect long-term adverse impacts on park visitors if the operations are close enough to have any impacts from “spill-over effects” of sedimentation and contamination from surface runoff, or if noise carries into park or operations are visible from park visitor use areas.
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term adverse effects on visitors from noise, visual disturbance and access restrictions that can occur on roads during reclamation. Long-term beneficial effects of restoration of sites, removal of sources of contamination and contaminated soils that are a safety hazard and visual eyesore.
Recovery actions against operators that damage park resources under 54 USC 100721	Long-term beneficial effects of cleanup of areas and recovery of natural resources that have been damaged from oil and gas spills that affected park lands and resources; removal of safety hazards and visual eyesores.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 58 includes an accounting of cumulative impacts that could affect visitor use and experience in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 58. CUMULATIVE IMPACTS ON VISITOR USE AND EXPERIENCE – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Road building.	Construction related actions have short-term adverse effects on visitor use from loss of access, noise, artificial light, and visible disturbance, but there are long term benefits from addition of roads.
Big South Fork National River and Recreation Area	Actions include facility and road construction; existing and future coal mining operations; prescribed fires; plugging and reclamation of abandoned wells including 39 under ARRA funded program.	Mining operations are visible to park visitors and have affected water quality in some areas; other construction related actions and fires have short-term adverse effects on visitor use from loss of access, noise, artificial light, and visible disturbance, and smoke adds odors and visibility issues, but there are long term benefits from addition of facilities and roads, and reduction of extreme fire potential. Beneficial impacts from abandoned well plugging – removal of hazardous and leaking equipment that had been accessible to visitors.
Big Thicket National Preserve	Actions include facility and road construction; plugging of abandoned wells under ARRA funded program.	Construction related actions have short-term adverse effects on visitor use from loss of access, noise, artificial light, and visible disturbance, but there are long term benefits from addition of facilities and roads. Beneficial impacts from abandoned well plugging – removal of hazardous equipment that had been accessible to visitors and created hazards to river navigation.
Cumberland Gap National Historic Park	Park developments and continued management of recommended wilderness in accordance with Wilderness Act and NPS policies; acquisition of Fern Lake and surrounding area.	Construction related actions have short-term adverse effects on visitor use from loss of access, noise, artificial light, and visible disturbance, but there are long term benefits from addition of facilities and roads. Benefits to visitors seeking wilderness experience from actions to manage wilderness and benefits to all visitors from acquisition of additional areas in the park.
Cuyahoga Valley National Park	Ongoing park operations and maintenance; road and trail construction. Invasive and nonnative species management inside and outside of the park; land acquisitions and easements; deer management planning.	Construction related actions have short-term adverse effects on visitor use from loss of access, noise, artificial light, and visible disturbance, but there are long term benefits from addition of roads, trails, and facilities; Short-term disturbance from presence of vegetation management crews (possible access disruption, noise, chemical use, odors); long-term beneficial effects of improved vegetative cover (improvement in the visible landscape); benefits from land acquisition include expanded areas for visitor use and enjoyment.
Gauley River National Recreation Area	Mined land reclamation.	Short-term impacts may occur to passive and active visitor use as a result of temporary construction noise associated with mine reclamation. Long –term beneficial cumulative impacts from mine reclamation include improved safety and access for passive and active visitors following the completion of reclamation activities.
Lake Meredith National Recreation Area	Actions include road and trail construction and maintenance; water impoundments (i.e., Lake Meredith); recreational ORV use.	Benefits to visitors from water impoundment; short- and long-term disturbances to some visitor uses where the noise and presence of ORVs is disturbing, also visible damage to soils, vegetation; benefits to those visitors desiring this type of recreation where permitted; construction related actions have short-term adverse effects on visitor use from loss of access, noise, artificial light, and visible disturbance, but there are long term benefits from addition of roads and trails.

Park Unit	Cumulative Actions	Description of Impacts
New River Gorge National River	Same as above.	Same as above.
Obed Wild and Scenic River	Catastrophic release.	Contamination from spill – resulted in limits on visitor use in the immediate area of the river and continued health and safety hazard and visual eyesore; intermittent source of noise until cleanup is completed.

Overall, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated operations would have a mostly beneficial impact on visitor use and experience in all category 1 park units, while exempt operations would cause adverse impacts stemming primarily from the current lack of regulation and oversight. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development occurring in the broader study area, the number of exempt wells involved, the distance of those wells to most high visitor use areas, and the other cumulative actions affecting the resource in the entire study area.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in measurable impacts. Impacts on visitor use and experience from permitted operations relating to noise, visual impacts, site contamination and safety, and access, would be as described for alternative A, no action.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations could slightly decrease the impacts from noise or visual intrusion of wells that are located relatively close to visitor use areas. Wells would not be relocated, but steps such as screening and proper equipment maintenance (grease and rod pump alignment) could serve to mitigate visual and noise impacts on visitors. If conditions were severely adverse for grandfathered operations, steps could have been taken earlier under the “imminent threat” provision to apply mitigation, and that did not occur. There would still be the presence of an industrial operation at the well locations, with impacts on scenic views that will affect many, but not all, visitors to the parks, depending on the visitor’s sensitivity to the presence of the wells and the desired experience. Impacts from workovers and production would also continue, as would the potential for releases of hazardous substances and exposure to oils and chemicals. However, the change in regulation would reduce indirect impacts and the risks of impacts on visitor use and experience from oil and gas operations because of the implementation of better operating practices, such as improved environmental and site safety standards, resulting in long-term beneficial impacts. Once the rule change is implemented, these operations would need to meet the least damaging standard that incorporates mitigation measures and the operating standards that are spelled out in the regulations. The operating standards that would now apply to previously exempt operations include the requirement for an emergency response plan, use of secondary containment systems to minimize the possibility of site

contamination, providing signage for information and safety, providing gating and fencing around wells and equipment to secure the site, removal of wastes and scrap, and securing of wells if production is suspended for more than 30 days. Old equipment and chemicals must be removed and any pits remediated. Contamination of sites (appendix D) would be cleaned up and remediated. These actions would result in reduced exposure to hazardous chemicals and equipment and contaminated debris.

Mitigation that could be required as part of the permitting of exempt operations includes basic housekeeping (removal of unused equipment, trash, debris, and contaminated soils; lubrication of moving equipment; vegetation control; road and pad maintenance; etc.). For sites in closer proximity to visitor use areas, additional mitigation such as keeping lighting to a minimum and using directional, shielded, timed lighting and low lumen lights; painting the operations to blend in better with the landscape; using muffling devices and directing noise away from visitor use areas if possible; or fencing or locked gates for site security. The proposed rules also require that operators must begin reclamation as soon as possible and no later than 6 months after the well is no longer in use. The sites would need to be graded to elevations that maximize ecological value and reestablish native vegetative communities. For those operations on private lands (previously access-exempt) where there is a reasonable chance of accidents affecting visitor use and experience on federal lands, bringing these operations within the scope of the 9B regulations will allow park managers to take a proactive approach to protecting the federal interest by ensuring that operations inside the park unit are conducted in a manner that offers the highest possible protection to a park's resources and values. The risk of impacts from spills that could reach park property and affect visitor use or experience by limiting access or creating a damaged landscape would be substantially reduced by implementation of strong spill prevention, control, and countermeasure technologies.

As previously discussed, oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs including many areas used by visitors. The permitting of future plans of operations within these park units would be subject to these SMA setback recommendations, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Looking at site-specific information available for the nine parks with previously exempt operations, under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. As a result, beneficial effects would occur to visitor use and experience through requirements to adhere to these standards and measures, and these are described above. Information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting the visitors that may be in and around the wells.

Bringing currently exempt oil and gas operations under the 9B regulations would result in a reduction in the severity of adverse impacts on visitor use and experience from oil and gas operations, particularly where there are a high number of operations near visitor use areas, such as those at Cuyahoga Valley National Park (see table 56). Although oil and gas operations would not be removed or relocated, improved standards at the site of operations would entail the application of appropriate levels of site

maintenance. Therefore, alternative B would result in long-term, direct beneficial impacts on visitor use and experience on previously exempt operations.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B, impacts on visitor use and experience would be the same as described under alternative A.

Financial Assurance

Impacts affecting visitor use and experience, such as having visual intrusion into the park setting and presence of hazardous substances and unsecured equipment at sites that are not yet plugged and reclaimed, would be remediated in a more timely manner with the enhanced financial assurance requirements under alternative B. Impacts on visitor use and experience from seismic operations are not generally tied to inadequate bond amounts, so this provision would not have much of an impact on this specific phase of oil and gas development. However, adequate bonding for drilling and production phases would provide funds for the NPS to reclaim sites sooner in the event of an operator default. This would result in a beneficial change to impacts on visitor use and experience compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. This would reduce the risk that the NPS would suffer unnecessary loss of use and reduce the potential for adverse impacts on visitor use and experience that could occur from the lingering presence of a visual intrusion or hazards from contaminated sites.

Enforcement and Penalties

Under alternative B, the new penalty provision that would be established would provide incentives for an operator to comply with the 9B regulations. That would, in turn, facilitate protection of park resources and values, including visitor use and experience, resulting in a long-term indirect beneficial impact compared to the existing condition.

Compensation for Access across Federally Owned Land

Under alternative B beneficial impacts on visitor use and experience may occur from compensatory reclamation activities that may be done in lieu of an access fee. These activities could include restoration of disturbed areas, including legacy oil and gas sites, to natural conditions, which would remove sources of visual intrusion, safety hazards, and limits to access. Over the long-term, beneficial impacts on visitor use and experience would accrue from such reclamation measures employed under alternative B, compared to the existing condition.

Cost Recovery

Under alternative B, increased monitoring and evaluation of operations that could be funded by permit application fees would allow for NPS to detect potential problems such as spills and releases, and ensure operational compliance, thereby mitigating potential impacts on many resources which are important sources of visitor enjoyment and use at the parks. While permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to visitor use and experience to the extent these funds were applied to increased monitoring and evaluation of operations. As a result, under

alternative B, cost recovery could have a beneficial impact on visitor use and experience compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, both adverse and beneficial cumulative impacts would occur from projects, plans and actions and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on visitor use and experience, as described in the above analysis. Bringing previously exempt operations under regulation would beneficially impact resources that form the basis for many types of visitor use and enjoyment. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on visitor use and experience from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

Compared to the existing condition, granting an exemption from the operations permit requirements would not substantially change the impacts from noise or visual intrusion of wells that are located relatively close to visitor use areas. Wells would not be relocated unless impacts were extremely severe and could not be mitigated, and it is not expected that would occur for any of the previously exempt wells. By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on visitor use and experience at the site-specific level of analysis.

Directional Drilling

The regulation of directionally drilled wells under alternative C may potentially remove a key incentive for operators to locate operations outside of park units. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed (O’Dell pers. comm. 2013d) (see the “Socioeconomics” section). As a result of the changes in alternative C, operators may be more likely to

select locations within park unit boundaries, thereby intensifying direct impacts on park resources, including visitor use and experience. If surface locations are sited within the park unit boundaries, adverse effects on park visitor use and experience would include those impacts previously described under “Typical Impacts of Oil and Gas Operations on Visitor Use and Experience” and include loss of access in certain areas, presence of an industrial use within a park and intrusion into natural settings, noise from drilling and production (including periodic workovers), and possible risk to health and safety from presence of hazardous substances, oil, and gases related to exploration and production activities that would be associated with wells.

Therefore, alternative C would be likely to create additional long-term direct adverse impacts to visitors in park units compared to the existing condition. However, a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, would facilitate protection of park resources, which are the basis for many visitor uses and experiences, resulting in a long-term indirect beneficial impacts on visitor use and experience.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, there would also be effects that would occur as a result of oil and gas operations that would continue to affect visitor use and experience where impacts cannot be avoided, and benefits from bringing previously exempt operations under regulations and the resultant reduction in adverse impacts, as described in the alternative B analysis. Alternative C would contribute to beneficial cumulative impacts through bringing previously exempt operations under regulation, and adverse cumulative impacts from the change in directional drilling regulations that could result in more oil and gas development within park units as opposed to outside park boundaries. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on visitor use and experience from the existing condition. Continuing impacts on visitor use and experience from regulated and exempt operations would be expected. Impacts would be as described in the analysis, with an increased risk of more severe or extensive adverse impacts on access-exempt or grandfathered sites unless those sites changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations would include possible exposure to contamination or safety hazards if sites are not cleaned up or properly secured, visual impacts of sites that may be exacerbated by site erosion and lack of adequate distance between sites and visitor use areas, noise impacts from equipment and crews, again due to the lack of setbacks as well as lack of equipment maintenance or muffling devices. As a result, there would be continuing impacts from ongoing oil and gas activities occurring within the park units. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal effects on visitors. Directionally drilled

wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site or if they can be seen or heard. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have effects on resources that in turn have effects on visitor use and experience. Thus, impacts on visitor use and experience would result from delays in proper reclamation or possible lack of funding or enforcement, which would increase the risk of sites being poorly maintained and free of debris or wastes. Because adverse impacts under alternative A would be localized and often intermittent or temporary in nature, sites on public lands would be required to be safe, and operations would not halt or inhibit visitor use and enjoyment of the parks, these impacts would not be significant. Adverse impacts on visitor use can result from visitors being exposed to odors or contamination through touch or inhalation. For access-exempt operations, impacts on visitor use and experience would be unlikely because the wells are sited on private lands, although odors and visual impacts can still affect visitors nearby. Instances of leaks and spills are very rare, but if a spill were to occur, depending on the magnitude of the release, it could have a locally significant impact. However, such impacts would be localized and limited in duration and severity.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts under the no-action alternative would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on visitor use and experience in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects as described above would accrue from the continued unregulated operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term indirect beneficial impacts on visitor use and experience, compared to the existing condition. These impacts would occur especially to those visitors who are disturbed by the presence and noise of wells in the parks. Benefits would accrue primarily from reduced risk to visitor use and experience due to previously exempt operations being subject to operating standards and mitigation as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the no-action alternative. This would result in improved site appearance from erosion/sedimentation control, cleanup of spills, wastes and debris, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefit the visitors using and viewing those resources compared to the existing condition. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would result in mostly localized, intermittent and/or temporary disturbance to park visitors, and because all sites would be required to be safe, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations. Adverse impacts of the oil and gas operations would be limited, localized, subject to regulatory review, and would not be significant.

Alternative C

Under alternative C, impacts of the regulatory changes would also be primarily beneficial compared to the existing condition, although the change in regulation of directionally drilled wells could move noise and visual impacts closer to park visitors. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells (operations located wholly on non-federally owned lands but still within the boundary of a park unit) not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term indirect beneficial impacts visitors if better standards are applied to wells drilled on park boundaries. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts within park boundaries following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to visitors such as exposure to contamination or safety hazards, visual impacts of sites with visible erosion or site contamination, and noise impacts from equipment and crews in park units compared to the existing condition, although these impacts would be localized and small in number. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefits the visitors that use or view those resources. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on visitor use and experience, primarily from bringing previously exempt operations under regulation. Because alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would result in mostly localized, intermittent and/or temporary disturbance to park visitors, the impacts of this alternative would not be significant.

Both adverse and beneficial cumulative impacts would accrue from projects, plans, and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial. Adverse impacts of oil and gas operations would be localized and limited and would not be significant.

SCENIC VIEWS AND NIGHT SKY RESOURCES

METHODOLOGY

Potential impacts on scenic views and night sky resources are assessed based on the actions being proposed and the various scenic qualities available at the NPS parks, with attention to nighttime lighting, visual sensitivities and the natural lightscape. Topic-specific context for assessing impacts of the alternatives to scenic qualities and night skies includes:

- The type of scenic qualities available (as noted in chapter 3, parks contain an unusually large number of areas that possess a high degree of scenic quality and visual sensitivity).
- The proximity of the areas with scenic qualities and areas with no artificial light sources to oil and gas operations.
- The potential for light pollution in the form of sky glow or light trespass/glare to travel to the park unit and impact natural lightscapes.

IMPACTS OF ALTERNATIVE A: NO ACTION

Typical Impacts of Oil and Gas Operations on Scenic Views and Night Sky Resources

Impacts from Geophysical Exploration

During geophysical operations, the presence of oil and gas personnel and their vehicles and equipment could cause adverse visual impacts for visitors that are seeking a park-like or natural experience. Flagging used to mark site lines can be distracting, and the cutting of survey lines through dense vegetation can require creation of paths for vehicles and crews and clear a line of sight that is not natural. Overall, given the short duration (weeks to a few months) of conventional surveys, the majority of impacts associated with geophysical surveys would be limited in both duration and geographic extent, although the line-of-sight cuts can persist until vegetation regrows. Based on the nature of exploration activities and their general limitations to the day-time hours impacts on night skies are not expected to occur.

Impacts of Well Drilling and Production

Visual impacts from drilling and production operations would be more substantial than other types of impacts, especially if well pads were placed in relatively undisturbed settings where visitors would be readily able to see the operation and all associated equipment and tanks. Although the type of rig used is highly variable, dependent on location and site-specific use requirements drill rigs can reach heights of 180 feet, which would be visible from multiple locations at greater distances and could intrude on a number of different viewsheds within different park units. Site clearing for well pad and access road construction would result in visible removal of park vegetation, creation of a pathway and an overall change in the natural scenery of the area, depending on the amount of clearing, location of the clearing and the park unit.

Lighting of drilling operations, which is typically provided using fluorescent high pressure sodium or metal halide lamps, could interfere with night sky resources. Depending on where the operations are sited, the design and installation of lighting, and the amount of activity and type of equipment used during the night, impacts include disturbance of night-sky views, increase in overall sky glow and anthropogenic light rations, and disruption of wildlife behaviors like migration, predation and mating. The operations, especially drilling, would increase the presence of work crews and equipment. Since drilling is a 24-hour, 7-day a week operation, these impacts would be continuous, and could last a week or two up to a few months. Hydraulic fracturing operations, although infrequent in park units, would require a few more weeks for completion. Hydraulic fracturing requires significant road traffic which increases nighttime lighting from vehicles and can negatively impact night resources in those corridors.

Production operations, although having a less intrusive human presence, would be visible for 20 years or longer. Coming across an oil production rig could be an unpleasant experience for visitors seeking a natural, outdoor experience at the park unit. The visual presence of oil and gas operations in a natural setting would adversely impact the areas by intruding on scenic qualities and viewsheds and overall adversely impacting park unit scenic qualities in the area of the rig. Oil and gas facilities, pads, and roads introduce forms, lines colors, and textures that contrast with the natural visual setting. In other circumstances where visitors are passing through parks and not focused on the natural setting, these impacts would not be as pronounced. The impacts would be less for those visitors who are less concerned with the presence of such operations, and where operations are naturally screened from view. Although unlikely in the event of oil spills, adverse impacts on visual qualities could occur, and depending on the severity and type of event could be long-term in nature and could potentially alter the viewshed.

Impacts of Plugging and Reclamation

The presence of earthmoving, demolition, and other equipment associated with plugging and reclamation activities would have similar impacts on scenic views and night sky resources as described for drilling and production operations. However, considering the smaller equipment that would be used compared to a drill rig and the limited duration of reclamation, impacts would likely be shorter in nature and would only adversely impact scenic qualities during the time of site reclamation. Plugging and reclamation would end disturbances from production activities, and the site would be restored to their original character. Reclamation of the well pads following plugging of the wells would serve to reduce long-term visual impacts and eliminate the unnatural views of the site. The actual time required to reclaim the site's scenic views would depend on many factors, including the amount and severity of the area impacted, the erosion potential of the site, productivity of the vegetation, topography, and soil characteristics, including contamination. Ultimately, the removal of the rig and associated structures and equipment, in conjunction with site reclamation, would have long-term localized beneficial effects on scenic views near the well sites. The effects on scenic views would range from a beneficial effect of having a natural setting restored, to essentially no effect on visitors for those wells in areas far from visitor uses or in locations where visitors have not been bothered by the presence of the wells. Beneficial impacts on night sky resources would also occur as a result of plugging and reclamation as all activities and night skies intrusions that occurred would cease and artificial lighting would be removed.

Regulated Operations (Current and Future)

Impacts on scenic views and night sky resources that would occur from ongoing or future permitted oil and gas production operations include those described above under "Typical Impacts of Oil and Gas Operations on Scenic Views and Night Sky Resources." The primary effects to scenic views from oil and gas operations are from the presence of the operations and work crews that cause visual disturbances to the natural environment of the parks. The primary effects to night sky resources are artificial lights that are not adequately shielded, directed, timed or installed with minimal lumens as well as flaring of natural gas in some instances. Current data indicate that there are 215 wells under plans of operation in the category 1 park units. The historic average of new drilling operations is about 4 proposals per year (NPS 2013). Therefore, approximately 80 to 100 new wells may be drilled and produced in the parks over the next 20 to 30 years.

Under alternative A, regulated operations are subject to the 9B regulations, which require that operating standards be met. Current operating standards and mitigation included with permitted wells require a 500-foot setback for visitor use areas and siting the well pads so they are screened from view by vegetation and topography if possible. The 500-foot setback required for visitor use and administrative areas under the 9B regulations would result in reducing the adverse impacts from drilling rig intrusion into the visual landscape. However, while impacts may be lessened for areas close to wells, adverse impacts would still exist. To further minimize the effects of visual intrusion from oil and gas operations and related landscape disturbances, flowlines could be sited in areas not highly visible, and drilling and production equipment could be painted to blend in with the surrounding environment.

There are several measures that can be used to mitigate the effects on night sky including minimizing lighting, shielding lights, directing lights, using timers and motion sensors to control when lights are active, using low lumen fixtures, and only using lights when nighttime activity warrants its use. These actions would result in a diminished effect to night skies in the immediate area. In addition to these mitigation measures, the NPS requires that operators meet the least damaging standard under the current approval process for plans of operation. These requirements include using the appropriate mitigation measures as recommended in the NPS Operators Handbook (NPS 2006b). Typical mitigation measures that minimize impacts on visual qualities include removal of contaminated soils, effective erosion control,

proper secondary containment around storage tanks, regular pump jack maintenance, and removal of debris, waste, and equipment no longer needed in operations. Observation of these practices would help keep the site in a condition that would not be a visual eyesore.

Impacts on scenic views and night sky resources from currently regulated and future operations also include the effects of geophysical (seismic) surveys that are conducted within the category 1 park units and may be conducted in category 2 park units. Since 1998, 20 seismic surveys have been conducted in 6 parks for an average of 1.4 surveys per year. All but one have been 3-dimensional seismic surveys covering large geographic areas. Going forward, the level of seismic activity is expected to taper off to about one proposed survey per year (NPS 2013). Impacts of these surveys include those described above under “Typical Impacts of Oil and Gas Operations to Scenic and Night Sky Resources.” The exact extent of the surveys would vary from operation to operation. However, under the current process for approval of seismic operations, mitigation measures that would minimize visual impacts include a 500-foot setback from visitor use areas; the removal of trash and debris; and the removal of flagging after surveys are completed. All generated wastes would be cleaned up and disposed of promptly. Scheduling operations outside of peak visitation periods or at night could also minimize impacts on viewsheds and night sky resources and are included as conditions of permit approval where needed. Overall, activities associated with surveys are marginal in nature and likely would not intrude on existing views. Thus, impacts are expected to be minimal.

Oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, including some that were designated to protect scenic views and night sky resources. For example, a 300-foot setback from trails for all operations, a 500-foot setback for geophysical exploration, and a 1,500-foot setback for drilling and production would be established for “Visitor Use and Administrative Areas SMAs” at Big South Fork National River and Recreation Area under the oil and gas management plan framework unless other mitigation that protects SMA resources and values is included and authorized in an approved plan of operations. Additionally, a “Special Scenery SMA” was established which requires viewshed analysis to be conducted prior to the commencement of production activities (NPS 2012b). Under the Big Thicket National Preserve oil and gas management plan, the “Visitor Use, Administrative and Other Use Areas SMA” includes 26 day use areas, 9 trails, multiple canoe routes and administrative areas, three cemeteries, and 2 private residential sites, all with 500- to 1,500-foot setbacks depending on the type of operation. The plan also includes SMAs for 8 birding hot spots and 5 hunting areas (NPS 2005). Under the oil and gas management plan for Lake Meredith National Recreation Area, a “No Surface Use” stipulation, in which case new non-federal oil and gas operations would not be permitted, would apply to several “Visitor Use and Administrative Areas SMAs,” including the following: 2 information stations located in the parks; 16 day and overnight use areas; 2 trails; 1 Canadian River Municipal Water Authority administrative area and 2 park administrative areas that also serve as information stations; all of these have 500- to 1,500-foot setbacks depending on the mitigation measures that are used. (NPS 2002b). At Padre Island National Seashore, the oil and gas management plan identifies several sensitive resource areas totaling 1,168 acres to be closed to surface access associated with non-federal oil and gas operations, including: the Malaquite Visitor Center and RV Campground, Bird Island Basin, and the Grasslands Nature Trail (NPS 2000b). The permitting of future plans of operations within these park units would be subject to these SMA setbacks or other restrictions, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

When current operations end and wells are plugged and sites are reclaimed, impacts on scenic views and night sky resources would be as described under “Typical Impacts of Oil and Gas Operations to Scenic

Views and Night Sky Resources.” Current projections are that about 4 existing wells per year would be plugged and reclaimed (NPS 2013). Provisions in the current regulations and approval process for well plugging ensure that sites are reclaimed properly and left in a clean and safe condition, which includes disposing of waste materials outside of the park, and employing erosion control measures on access roads and well sites. Well plugging and surface reclamation would result in sites being restored to natural contours and revegetated, the wells properly plugged, and all equipment and wastes removed. Artificial lighting would be removed and flaring activities would cease. Pads can be contoured to fit the landscape, creating irregular edges on vegetation clearing lines. All of these measures would benefit the visual resources at the park units. Although earth moving equipment creates noise, dust, and limit access during plugging actions, these disturbances are temporary. Once cleanup is successfully completed and the site is reclaimed to natural conditions, there are beneficial effects on the visual character of the site and surroundings. The beneficial impacts of plugging and reclamation are realized over the long term as site vegetation becomes reestablished.

Currently Exempt Operations

Under the no-action alternative, existing and future “access-exempt” operations and existing grandfathered operations would also result in impacts on scenic views and night sky resources. These impacts can be more extensive or more severe compared to impacts that occur from regulated operations because exempt operations are not subject to NPS operating standards and mitigation measures that would serve to remove or reduce impacts, although existing exempt operations are often not lighted and would have few night sky impacts.

The following discussion provides more site-specific detail of the current and potential impacts on scenic views and night sky resources from activities associated with these currently exempt operations. The distance of exempt operations from visitor use areas is used here as a proxy indicator of visual impacts. Currently, there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. Impacts on scenic views and night sky resources that would occur from ongoing exempt operations include those described above under “Typical Impacts of Oil and Gas Operations to Scenic Views and Night Sky Resources.” However, because these operations are not fully regulated, there is a higher level of risk of impacts from the proximity of wells to visitor use areas, which allow them to be more readily seen by visitors, as well as from the lack of screening requirements that would otherwise minimize visual disturbances to the landscape and to the night sky if lighting is present. Similar to regulated operations, the primary impact is the visual intrusion of an industrial use in a park setting, which would degrade the experience of those visitors seeking a natural park experience. These impacts would last until reclamation is complete. Both grandfathered and access –exempt operations would present similar impacts, although the access –exempt operations may be better secured from visitors because they are on private property, which may be fenced or otherwise secured and not as accessible as the surrounding national park lands.

Exempt operations have the potential for continuing adverse impacts from the possible visual exposure to wastes and hazardous substances. As noted in appendix D of this EIS, NPS inventory data has documented many instances of soil contamination and erosion on grandfathered sites that do not rise to the level of warranting suspension. Site-specific data reveal several instances of currently grandfathered operations that have been documented as having some form of contamination occurring on site, and the NPS has identified operating conditions at access-exempt sites that could potentially impact resources such as scenic views on federally owned lands. Poor operating practices at these sites sometimes leads to spills, leaks and other releases of oils, produced water, or other chemicals on site. There are instances of spills that have contaminated soils in certain locations and have not been cleaned up, as noted in several site inspection reports from Cuyahoga Valley National Park and Big South Fork National River and Recreation Area. Review of 122 site inspection reports from Big South Fork revealed 8 exempt wells with wellhead leaks and 14 with spills, plus 1 tank battery leak and 1 pump jack leak. Several of the reports

included information on the size of the contaminated areas, which ranged from less than 10 square feet for 6 of the wells, to up to 2,000 square feet at one site and “the entire wellpad” for another. The field inspection report for well 2979 at Big South Fork indicates a 2,000-square-foot area of oil contamination with the presence of wetland and river nearby. Review of 41 site inspection reports at Cuyahoga Valley revealed 16 wells with wellhead leaks and 5 with spills, and 11 tank battery leaks and 1 pump jack leak. Information about the extent of the spills was not recorded (see appendix D). Adverse impacts on scenic views can result from instances of site contamination at exempt wells whereby visitors accessing the site can witness these events detracting from the scenic views of the area. Under the no-action alternative, issues of contamination occurring at sites of exempt operations are expected to continue or to be cleaned up at the discretion of the operator, resulting in a continued potential for long-term adverse impacts on view sheds if the contamination is not remediated in a timely manner. For access-exempt operations, impacts on scenic views would be less likely because the wells are sited on private lands.

In addition to the potential for visual impacts of contaminated sites, exempt operations also have impacts due to their locations near visitor use areas, where they can be more easily seen, thus impacting visitor use and experience by detracting from scenic views and the night sky resources of the park unit and thereby reducing the quality of visitor experience. Table 56 in “Visitor Use and Experience” presents site-specific information regarding proximity of exempt operations to visitor use areas (based on geospatial analysis of information obtained from the parks). Visitor use areas within a 500-foot distance of exempt wells include some trails, campgrounds, visitor centers, and other areas designated for visitor use such as scenic overlooks and interpretive sites. A total of 43 visitor use areas have been identified which are likely to experience the aforementioned impacts to scenic views and night sky resources. It should be noted, however, that not all areas used by visitors are included in the database, and there would be visual impacts to scenic views from rivers and trails that are not included.

Directional Drilling

Under the no-action alternative the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units avoids direct impacts on resources occurring within the park unit and displaces a source of visual intrusion to a location outside the park. However, wells directionally drilled and produced from outside park units to bottomholes beneath the park units could directly impact scenic views on adjacent lands as well as presenting a risk of indirect impacts to visitors that are located near the park boundary and within view of the activity. Under the 9B regulations, the NPS cannot require preventative mitigation measures, even if the operations may indirectly affect park resources by their proximity to the park. For example, the intrusion of a well located at the park boundary could impact night skies within the park and the NPS cannot require measures that would control the timing or use of equipment that creates the night sky intrusion. Impacts could also occur from soil erosion and runoff that can reach park resources that are viewed by the public. The risk and intensity of impacts on park scenic views would increase for operations sited closer to park boundaries where water and sediment can be transported downslope into park units through streams, gullies, or overland flow. Intensity of impacts within the park would depend on proximity of operations to the park units; site specific environmental conditions, such as steepness and direction of slope and surface hydrology; and mitigation measures being employed.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limits, it is likely that many sites would have insufficient bonding for reclamation. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, remediation of well sites could be delayed indefinitely. Until well plugging and surface reclamation is completed, there would be potential adverse impacts on scenic views at some well

locations and in some parks because of the continued presence and visual intrusion of these operations as well as possible debris, or unsecured or leaking equipment on site. Night skies are less likely to be affected because lighting would generally not be present on such sites. Other wells that are not in high visitor use areas and/or have no safety issues could have a delayed reclamation due to limits on bonding, would similarly have the potential to impact scenic views. There are also instances where the current bonding is adequate to reclaim sites to the point of reducing impacts on visitors by providing for grading and revegetation, and the current financial assurance limits would have essentially little or no impact on scenic views. Because performance bond amounts rarely approach \$200,000 for seismic operations, impacts on scenic views from these operations are not generally tied to inadequate bond amounts. However, delayed reclamation for some operations could result in unnecessary adverse impacts on the scenic views as described above that could become long-term adverse impacts.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations, impacts on scenic views could result from leaks or spills that could occur with no financial assurance to cover the cost of cleanup if there is no performance bond in place which could be unsightly. If the new owner defaults before posting financial assurance, the NPS would need to seek and acquire funding for cleanup or reclamation. Reclamation could be delayed indefinitely. Over the interim period, there would be the continued visual intrusion of these areas, and the potential adverse impacts on scenic views would continue until they were properly mitigated.

Enforcement and Penalties

Under the no-action alternative the absence of penalties for minor acts of noncompliance would result in the continued lack of incentive for operators to comply fully with NPS operating standards. This would increase the risk of unnecessary impacts to visual quality and scenic views from contamination from spills and increase site erosion, all of which could be unsightly.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages that result from privileged use of federal surface estate. This provision would have no impacts on scenic views or night sky resources.

Cost Recovery

Under the no-action alternative, the lack of cost recovery could have an indirect adverse impact on scenic views and night sky resources because additional money collected to support NPS permitting, monitoring, and compliance programs could be used to enhance park resources or provide more pleasing, safe and natural resource conditions that are accessible for visitors to view. Benefits from cost recovery could accrue to scenic views and night sky resources to the extent these funds were applied to increased monitoring and evaluation of operations, such as ensuring that operations are meeting proper maintenance requirements for lighting systems that serve to reduce light spillover. Therefore, the non-recovery of costs under the no-action alternative would result in adverse impacts on scenic views and night sky resources.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect scenic views and the night sky resources in the parks. Management planning, such as fire management, vegetation management, ORV, and oil and gas management plans, can result in greater protection for park resources that are the basis for much of the parks' scenic views and night sky

resources. Conversely, actions that cause disturbance of these resources would include activities such as prescribed burns, ORV use, and any general construction or maintenance activities that include excavation, grading, or presence of work crews. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on scenic views and night sky resources in the area of analysis and a brief summary of the cumulative impacts of these actions on scenic views and night sky resources are listed in table 59.

TABLE 59. CUMULATIVE IMPACTS ON SCENIC VIEWS AND NIGHT SKY RESOURCES (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Scenic Views and Night Sky Resources
Prescribed fires and fire management actions	Short-term and long-term adverse effects during controlled burns, which lead to a reduction in visibility from smoke. Visibly burned areas detract from scenic views. Long-term beneficial effects of reduced fire occurrences with managed burns that reduce the possibility of catastrophic and high intensity fire that can affect scenic views and the night sky.
NPS facility and road construction	Short-term adverse effects on scenic views from visible disturbance during construction. Headlights from vehicles can have a short-term adverse effect on wildlife and visitors.
Vegetation management	Short-term disturbance from presence of vegetation management crews, long-term beneficial effects of improved vegetative cover leading to an improvement in the visible landscape.
Trails development and maintenance	Short-term adverse effects on scenic views from visible disturbance during construction or maintenance, and long-term adverse effects from addition of trails and development.
ORV use	Short- and long-term disturbances from dust and pollution emissions from ORV use and visible damage to soils and vegetation; benefits to those visitors desiring this type of recreation to obtain access to viewsheds. Headlights from vehicles can have a short-term adverse effect on wildlife and visitors.
Abandoned mine lands reclamation	Short-term adverse effects on viewsheds from construction during reclamation. Long-term beneficial effects to scenic views after the reestablishment of vegetation cover and natural contours and closure of mine shafts.
Future oil and gas development on adjacent lands	Indirect long-term adverse impacts on scenic views of parks if the operations are close enough to have any impacts from “spill-over effects” of sedimentation and contamination from surface runoff, or if operations are visible from park visitor use areas and if lighting from these operations impacts the night sky resources within the park unit.
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term adverse effects on scenic views from presence of construction equipment during reclamation. Long-term beneficial effects of restoration of sites, removal of sources of contamination and contaminated soils that are visually detracting from the surrounding natural environment. Any lighting or flaring activities would cease and therefore have a long-term beneficial effect on night sky resources.
Recovery actions against operators that damage park resources under 54 USC 100721	Long-term beneficial effects following cleanup of areas and recovery of natural resources that have been damaged from oil and gas spills that have created visual impacts on the parks’ natural landscapes.
Development on lands adjacent to park units	Long-term adverse impacts on night skies from spill-over effects of lighting for commercial and residential development.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 60 includes an accounting of cumulative impacts that could affect scenic views and night sky resources in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 60. CUMULATIVE IMPACTS ON SCENIC VIEWS AND NIGHT SKY RESOURCES – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Road building.	Construction related actions have short-term adverse effects on scenic views as a result of visible disturbance. Headlights from vehicles can have a short-term adverse effect on wildlife and visitors.
Big South Fork National River and Recreation Area	Actions include facility and road construction; existing and future coal mining operations; prescribed fires; plugging and reclamation of abandoned wells including 39 under ARRA funded program.	Mining operations are visible to park visitors; other construction related actions and fires have short-term adverse effects through visible disturbance, and smoke adds visibility issues, but there are long term benefits from the reduction of extreme fire potential. Beneficial impacts would result from abandoned well plugging and associated revegetation and removal of facilities and lighting. Lighting at facilities can have adverse effects on night sky resources. Headlights from vehicles can have a short-term adverse effect on wildlife and visitors.
Big Thicket National Preserve	Actions include facility and road construction; plugging of abandoned wells under ARRA funded program.	Construction related actions have short-term adverse effects on visitor use from visible disturbance. Beneficial impacts would result from abandoned well plugging and associate revegetation and removal of facilities and lighting.
Cumberland Gap National Historic Park	Park developments and continued management of recommended wilderness in accordance with Wilderness Act and NPS policies; acquisition of Fern Lake and surrounding area.	Construction related actions have short-term adverse effects on scenic views as a result of visible disturbance to the landscape. Benefits to visitors seeking wilderness experience and the associated views and dark skies as well as the additional of views from acquisition of additional areas in the park.
Cuyahoga Valley National Park	Ongoing park operations and maintenance; road and trail construction. Invasive and nonnative species management inside and outside of the park; land acquisitions and easements; deer management planning.	Construction related actions have short-term adverse effects on scenic views and night sky resources as a result of visible disturbances and lighting. Short-term visual disturbance from presence of vegetation management crews; long-term beneficial effects of improved vegetative cover (improvement in the visible landscape); benefits from land acquisition include expanded areas for potential new viewsheds. Lighting at facilities can have adverse effects on night sky resources. Headlights from vehicles can have a short-term adverse effect on wildlife and visitors.
Gauley River National Recreation Area	Mined land reclamation.	Short-term adverse effects on to viewsheds from crews and equipment during reclamation. Long-term beneficial effects to scenic views and night sky resources after the reestablishment of vegetation cover and natural contours and closure of mine shafts and removal of lighting and flaring.

Park Unit	Cumulative Actions	Description of Impacts
Lake Meredith National Recreation Area	Actions include road and trail construction and maintenance; water impoundments (i.e., Lake Meredith); recreational ORV use.	Short- and long-term disturbances to scenic views where the presence of ORVs is disturbing and detracts from viewsheds, also visible damage to soils, vegetation; construction related actions have short-term adverse effects on viewsheds from visible disturbance. Lighting at facilities can have adverse effects on night sky resources. Headlights from vehicles can have a short-term adverse effect on wildlife and visitors.
New River Gorge National River	Same as above.	Same as above.
Obed Wild and Scenic River	Catastrophic release.	Contamination from spill – resulted in limits on scenic views in the immediate area of the river and the creation of a visual eyesore; intermittent source of visual intrusion by crews and equipment until cleanup is completed.

Overall, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated operations would have a mostly beneficial impact on scenic views and the night sky in all category 1 park units, while exempt operations would cause adverse impacts stemming primarily from the current lack of regulation and oversight. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development occurring in the broader study area, the number of exempt wells involved, the distance of those wells to most high visitor use areas and the views occurring from those areas both during the day and at night, and the other cumulative actions affecting the resource in the entire study area.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in measurable impacts. Impacts on scenic views and night sky resources would be as described for alternative A.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations could slightly decrease the impacts from the visual intrusion of wells that are located relatively close to visitor use areas. Wells would not be relocated, but steps such as screening, painting, and proper equipment maintenance could serve to mitigate visual impacts on visitors. If conditions were severely adverse for grandfathered operations, steps would have been taken earlier under the “imminent threat” provision to apply mitigation, and that did not occur. There would still be the presence of an industrial operation at the well locations, with impacts on scenic views and night sky resources that will affect many, but not all, visitors to the parks, depending on the visitor’s sensitivity to the presence of the wells and the desired experience. Impacts from workovers and production would also continue, as would the potential for releases of hazardous substances and exposure to oils and chemicals. However, the

change in regulation would reduce indirect impacts and the risks of impacts on scenic views from oil and gas operations because of the implementation of better operating practices, resulting in long-term beneficial impacts. Once the rule change is implemented, these operations would need to meet the least damaging standard that incorporates mitigation measures and the operating standards that are spelled out in the regulations. The operating standards that would now apply to previously exempt operations include the requirement for an emergency response plan, use of containerized mud systems to minimize the possibility of site contamination, providing fencing around wells and equipment to secure the site, removal of wastes and scrap, and shutting in of wells if drilling and production is suspended for less than 30 days. These measures would reduce the likelihood of visitors seeing unkempt sites, debris, or sites with visible contamination and reduce impacts on scenic views. Using fully sustainable lighting that is directed, shielded and minimal, or turning off lights when not warranted by onsite activities would minimize impacts to night skies. Mitigation that could be required as part of the permitting of exempt operations keeping lighting to a minimum and using directional lighting, shielded lighting, timed lighting, low lumen lights (for any operations with lighting), and painting the operations to blend in better with the landscape, which would reduce impacts to the viewer and help to blend the facility in with the landscape. Other measures that could be required to minimize visual impacts include basic housekeeping (removal of unused equipment, trash, debris, and contaminated soils, vegetation control, road and pad maintenance, etc. The proposed rules also require that operators must begin reclamation as soon as possible and no later than 6 months after the well is no longer in use. The sites would need to be graded to elevations that maximize ecological value and reestablish native vegetative communities. For those operations on private lands (previously access-exempt) where there is a reasonable expectation of effects on scenic views and night sky resources on federal lands, bringing these operations within the scope of the 9B regulations will allow park managers to take require appropriate measures to protecting the federal interest by ensuring that operations inside the park unit are conducted in a manner that offers the highest possible protection to a park's resources and values. The risk of impacts from spills that could reach park property and affect scenic views creating a damaged landscape would be substantially reduced by implementation of strong spill prevention, control, and countermeasure technologies.

As previously discussed, oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs including areas of high scenic views, such as the special scenery SMA at Big South Fork. The permitting of future plans of operations within these park units would be subject to these SMA setback recommendations, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. As a result, beneficial effects would occur to scenic views and the night sky resources through requirements to adhere to these standards and measures, as described above. Information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting the scenic views and night sky resources that may be in and around the wells.

Bringing currently exempt oil and gas operations under the 9B regulations would result in a reduction in the severity of adverse impacts on scenic views and night sky resources from oil and gas operations, particularly where there are operations near high use visitor use areas such as those present at Cuyahoga Valley National Park (see table 56 in “Visitor Use and Experience”), and dark night skies or sensitive natural systems. Although oil and gas operations would not be removed or relocated, improved standards at the site of operations would entail the application of appropriate levels of site maintenance. Therefore, alternative B would result in long-term, direct beneficial impacts on scenic views and night sky resources on previously exempt operations.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B, impacts on scenic views and night sky resources would be the same as described under alternative A.

Financial Assurance

Impacts affecting visual quality and night sky resources, such as having visual intrusion into the park setting, increase in artificial light, and presence of hazardous substances and unsecured equipment at sites that are not yet plugged and reclaimed, would be remediated in a more timely manner with the enhanced financial assurance requirements under alternative B, leading to beneficial impacts. Impacts on scenic views and night sky resources from seismic operations are not generally tied to inadequate bond amounts, so this provision would not have much of an impact on this specific phase of oil and gas development. However, adequate bonding for drilling and production phases would provide funds for the NPS to reclaim sites sooner in the event of an operator default. This would result in a beneficial change to impacts on scenic views and night sky resources compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. This would reduce the risk, albeit minimal, that the NPS would suffer unnecessary loss of use and reduce the potential for adverse impacts on scenic views and night sky resources that could occur from the lingering presence of a visual intrusion, artificial light, or unsightly hazards from contaminated sites.

Enforcement and Penalties

Under alternative B, the new penalty provision that would be established would provide incentives for an operator to comply with the 9B regulations. That would, in turn, facilitate protection of park resources and values, including scenic views and night sky resources, resulting in a long-term indirect beneficial impact compared to the existing condition.

Compensation for Access across Federally Owned Land

Under alternative B, beneficial impacts on scenic views may occur from compensatory reclamation activities that may be done in lieu of an access fee, which could include restoration of disturbed areas, including legacy oil and gas sites, to natural conditions. Over the long-term, beneficial impacts on scenic views would accrue from such reclamation measures employed under alternative B, compared to the existing condition.

Cost Recovery

Under alternative B, increased monitoring and evaluation of operations that could be funded by permit application fees would allow for NPS to detect potential problems such as spills and releases, and ensure operational compliance, thereby mitigating potential impacts on many resources including scenic views and night sky. Although permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to scenic views and night sky resources to the extent these funds were applied to increased monitoring and evaluation of operations, such as ensuring that operations are meeting proper maintenance requirements for lighting systems that serve to reduce light spillover. As a result, under alternative B, cost recovery could have a beneficial impact on scenic views and night sky resources compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, both adverse and beneficial cumulative impacts would occur from projects, plans and actions and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on scenic views and night sky resources, as described in the above analysis. Bringing previously exempt operations under regulation would add substantial beneficial impacts on visual resources and night sky resources. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B, except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on scenic views and night sky resources from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

Compared to the existing condition, granting an exemption from the operations permit requirements would not substantially change the impacts from visual intrusion of wells and artificial light that are located relatively close to visitor use areas and sensitive night resources. Wells would not be relocated unless impacts were extremely severe and could not be mitigated, and it is not expected that would occur for any of the previously exempt wells. By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on scenic views and night sky resources at the site-specific level of analysis.

Directional Drilling

The regulation of directionally drilled wells under alternative C may potentially remove a key incentive for operators to locate operations outside of park units. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed (O'Dell pers. comm. 2013d) (see the "Socioeconomics" section). As a result of the changes in alternative C, operators may be more likely to select locations within park unit boundaries, thereby intensifying direct impacts on visual resources in the park. If surface locations are sited within the park unit boundaries, adverse effects on existing viewsheds and to night sky resources would include those impacts previously described under "Typical Impacts of Oil and Gas Operations on Scenic Views and Night Sky Resources" and include the presence of an industrial use within a park and intrusion into natural settings. Location in the park would mean that mitigation would be required to reduce night sky impacts, which would not be required outside the park; however, this comes with the adverse effect of having the operation in the park and the associated impacts on the scenic views in the park.

Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to scenic views within park units compared to the existing condition. However, a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, would facilitate protection of scenic views and night sky resources resulting in long-term indirect beneficial impacts.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, there would also be effects that would occur as a result of oil and gas operations that would continue to affect scenic views and night sky resources where impacts cannot be avoided, and benefits from bringing previously exempt operations under regulations and the resultant reduction in adverse impacts, as described in the alternative B analysis. Alternative C would contribute to beneficial cumulative impacts through bringing previously exempt operations under regulation, and adverse cumulative impacts from the change in directional drilling regulations that could result in more oil and gas development within park units as opposed to outside park boundaries. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on scenic views and night sky resources from the existing condition. Continuing impacts on scenic views and night sky resources from regulated and exempt operations would be expected. Light pollution can impact human perception of the night sky, natural landscape, ecological processes, and wildlife interactions. The risk of impacts of artificial lighting would be more severe or extensive from access-exempt or grandfathered sites unless those sites changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations would include visual impacts of sites that may be exacerbated by site erosion and lack of adequate distance between sites and visitor use areas, and intrusion of artificial lighting and flaring on night sky resources. As a result, there would be continuing impacts from ongoing oil and gas activities occurring within the park units. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal effects on scenic views and night sky resources. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site or if they can be seen. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have effects on resources that in turn have effects on scenic views and night sky resources. Thus, impacts on scenic views and night sky resources would occur as a result of delays in proper reclamation or possible lack of funding or enforcement, which would increase the risk of sites being poorly maintained and free of debris or wastes. Because adverse impacts under alternative A would not alter essential and important park scenic views, would be generally localized to well sites, and would not disrupt views of the night sky to the extent that it would affect most visitors, these impacts would not be significant.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts under the no-action alternative would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on scenic views and night sky resources in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects as described above would accrue from the continued unregulated operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term indirect beneficial impacts on scenic views and night skies, compared to the existing condition. Light pollution can impact human perception of the night sky, natural landscape, ecological processes, and wildlife interactions. The impacts of artificial lighting had been documented at long distances. Previously permitted operations would continue with no change in effects. Benefits would accrue due to previously exempt operations being subject to operating standards and mitigation as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the no-action alternative. This would result in improved site appearance from erosion/sedimentation control, cleanup of spills, wastes and debris, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition. Keeping artificial lighting to a minimum and using directional shielded lighting, using timers and motion sensors so light is only on when needed, and

low lumen lights would reduce impacts on night sky resources. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition and funding sources that could indirectly benefit resources at the parks, which indirectly benefit scenic views and night sky resources. Overall these regulatory improvements would result in long-term indirect beneficial impacts on scenic views and night sky resources compared to the existing condition. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and adverse effects of regulated operations would be very limited in extent compared to the entire park area, and mitigation measures or stipulations would reduce the loss or degradation of visual quality and night sky overall, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations. Adverse impacts of oil and gas development would be localized, subject to park review, and limited and would not be significant.

Alternative C

Under alternative C, impacts of the regulatory changes would also be primarily beneficial compared to the existing condition, although the change in regulation of directionally drilled wells could move visual impacts into the park units. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells (operations located wholly on non-federally owned lands but still within the boundary of a park unit) not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts such as visual impacts of sites that may be exacerbated by site erosion or contamination, and intrusion of artificial lighting and flaring on night sky resources on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term indirect beneficial impacts on scenic views and especially night sky resources if better standards (e.g., reduced or shielded lighting requirements) are applied to wells drilled on park boundaries; however, regulating directional drilling could potentially result in adverse impacts by having wells locate within park boundaries due to the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C would be likely to create additional long-term, direct adverse impacts to scenic views within park units compared to the existing condition, although these impacts would be localized and small in number. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefits visual resources and night sky resources. Because alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would be limited in extent compared to the entire park area, and mitigation measures or stipulations would reduce the degradation of visual quality and night sky, the impacts of this alternative would not be significant.

Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial. Adverse impacts of oil and gas development would be localized, subject to park review, and limited, and would not be significant.

NATURAL SOUNDSCAPES AND ACOUSTIC ENVIRONMENT

METHODOLOGY

Certain key terms are important to this impacts analysis. *Acoustic resources* are physical sound sources, including both natural sounds (wind, water, wildlife, vegetation) and cultural and historic sounds (battle reenactments, tribal ceremonies, quiet reverence). The *acoustic environment* is the combination of all the acoustic resources within a given area—natural sounds as well as human-caused sounds. The acoustic environment includes sound vibrations made by geological processes, biological activity, and even sounds that are inaudible to most humans, such as bat echolocation calls. *Soundscape* is the component of the acoustic environment that can be perceived and comprehended by the humans. The character and quality of the soundscape influence human perceptions of an area, providing a sense of place that differentiates it from other regions. *Noise* refers to sound which is unwanted, either because of its effects on humans and wildlife, or its interference with the perception or detection of other sounds. *Cultural soundscapes* include opportunities for appropriate transmission of cultural and historic sounds that are fundamental components of the purposes and values for which the parks were established.

Impacts on natural soundscapes and the acoustic environment can be compared to natural ambient conditions and are typically assessed based on the distance between a sound source and the receptor, the characteristics of the land located between the source and the receptor, the nature of the receptor's activity, and the increase in sound level above natural ambient sound levels. Frequency, amplitude, and duration should all be considered when describing impacts.

For site-specific analysis, locations of the well pads of exempt operations were mapped relative to visitor use areas (such as visitor centers, picnic areas, campgrounds, and trails) if this information was available in the parks' GIS data to assess impacts of those operations. Other considerations such as wildlife behavior, wildlife habitat, cultural soundscapes, the intrinsic acoustic environment, and overall soundscape were not considered in the site-specific analysis.

Potential sound levels at various distances from pieces of heavy construction equipment typically used during geophysical exploration, drilling and production, and plugging and reclamation associated with oil and gas operations were estimated (table 61). Additional sound sources that occur during production but are not addressed in table 61 include generators, compressors, and pumps. The Federal Highway Administration's Roadway Construction Noise Model contains a database of common construction equipment. The database includes a list of the noise levels produced by each piece of construction equipment at a distance of 50 feet, as per the equipment specifications. This database is an accepted resource for common construction equipment sound levels. Additionally, the Federal Transportation Administration Transit Noise and Vibration Impact Assessment guidelines contain typical equipment noise levels at 50 feet from the source (FHWA 2006). These references were used to subsequently approximate noise levels at distances beyond 50 feet, which may be audible within the park units. As the construction equipment may be thought of as point sources of noise, the radiation pattern is such that the sound level would drop off at a rate of 6 dBA per doubling of distance from the source, based solely on source geometry without taking site surface conditions into consideration (Caltrans 1998).

TABLE 61. EQUIPMENT NOISE LEVEL PREDICTIONS (dBA)

Distance from Source (feet)	Grader/Bulldozer/ Concrete Pump Truck/Chainsaw	Dump Truck	Front-End Loader	Drill Rig/Rotary Drilling	Concrete Mixer Trucks	Diesel Truck
50	85	84	80	75	82	88
100	79	78	74	69	76	82
200	73	72	68	63	70	76
400	67	66	62	57	64	70
800	61	60	56	51	58	64
1,600	55	54	50	45	52	58
3,200	49	48	44	39	46	52
6,400	43	42	38	33	40	46
12,800	37	36	32	27	34	40
25,600	31	30	26	21	28	34

Notes:

Equipment noise levels represent specification values for a reference distance of 50 feet from the equipment source.

Predicted noise levels beyond 50 feet from the source were estimated assuming a 6 dBA drop-off rate per doubling of distance for a point source (stationary equipment sources may be regarded as point sources) based solely on source geometry (Caltrans 1998).

Equipment noise levels at the distances shown in this table will vary based on additional attenuation measures, including vegetation, topography, and climate conditions.

Noise from a drill rig/rotary drilling was estimated based on a measured level of 63 dBA at 200 feet for a typical drill in Wyoming. This noise level is consistent with a report on air-rotary drilling published by the National Institute for Occupational Safety and Health (NIOSH 2009). The report identified noise levels of approximately 90 dBA measured within 6 feet of the rig. This level was extrapolated to 50 feet and compared to the extrapolated level at 50 feet from the Wyoming data. The levels were within 2 decibels of each other.

IMPACTS OF ALTERNATIVE A: NO ACTION

Typical Impacts of Oil and Gas Operations on Natural Soundscapes and Acoustic Environment

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on natural soundscapes and the acoustic environment can result from equipment noise generated during vegetation clearing and road building, and noise from vehicles delivering survey equipment and personnel. Vehicles may include trucks, helicopters or ORVs. Chainsaws are often used to clear a survey line of sight. Additionally, noise associated with seismic surveys would occur from the use of Vibroseis® trucks (vehicle-mounted vibrators) or, alternatively, drilling holes in the earth, and detonating explosive charges in the holes.

Noise generated by these seismic survey activities would be intermittent and typically occurs over a period of 3 weeks to 3 months. Helicopters, when used, are the primary noise source in seismic operations. Often two or more helicopters are used to support a seismic shoot. In these cases, the noise would be continuous during daytime operations but limited to a 2- to 3-week timeframe within the active area of operations. However, these operations have the potential to produce sounds of considerable

amplitude. Helicopter noise would be intermittent and limited to certain flight paths to and from the survey operations, but would increase sound levels near flight paths.

Impacts of Well Drilling and Production

Most of the adverse impacts associated with oil and gas operations within park units would result from the drilling and production phase, because construction of the well necessitates the majority of the heavy construction equipment that have considerable sound levels, and production has a long duration. Potential sources of noise associated with drilling and production include the construction of roads and trails for accessing the site, preparation of the drill site, drilling operations, cement work, well servicing, and workover operations. Truck traffic would also add to noise. In the event that hydraulic fracturing is used for extraction, this would produce additional sound impacts, since that technology requires large truckloads of water, produced water, and chemicals and larger trucks to transport the equipment needed for drilling. Hydraulic fracturing operations also tend to take a few weeks longer to drill and produce, which would add to the duration of the noise impacts to the soundscape and acoustic environment, although the effect would still be a short-term impact.

Table 61 presents some of the typical construction equipment associated with each of these activities and their associated noise levels predicted at various distances from the source. As described in the “Methodology” section above, predicted levels are representative of noise attenuation at a rate of 6 dBA per doubling of distance from the sound source (the noise level drop-off rate from a stationary point source purely due to the geometry of the source). Though additional attenuation could be realized due to vegetation cover, intervening topography and meteorological conditions, low frequency sounds commonly produced by mechanized equipment (like vehicles, pumps, and drill rigs) travel great distances.

Accessing new well locations in remote areas could require upgrading of existing roadways and/or construction of new roads and trails to accommodate heavy construction equipment and increased truck traffic. Subsequently, once the drill site is accessed, clearing, grading, cutting, filling, and leveling of the well pad is required to prepare the drill site to accommodate the rig and other equipment. Common equipment used for the construction of access roads as well as preparation of the well pad includes graders, bulldozers, front-end loaders, and dump trucks. Concrete mixer and pump trucks may also be used for the cementing of oil-well casing. As shown in table 61, graders, bulldozers, concrete mixer trucks, and dump trucks all produce similar noise levels (graders, bulldozers, and concrete mixer trucks produce 85 dBA at 50 feet, while dump trucks produce 84 dBA) and would be the loudest pieces of equipment used for site access and well pad preparation.

Generally, when numerous pieces of equipment are in use concurrently, the loudest piece of equipment dominates, especially when a large difference exists between the noise generated by each piece of equipment. Conversely, when sound power levels from two pieces of equipment in concurrent operation are the same, the combined level is approximately 3 dB higher. As such, during drilling and well construction activities, it can be expected that noise levels would reach 88 or 90 dBA at 50 feet from the operation. During production, noise would be generated by gas compressors or jack pumps (approximately 89 dBA and 82 dBA, respectively), depending on the resource being extracted.

Measured acoustical data describing natural ambient sound levels (the environment of sound that exists in the absence of human-caused noise) at category 1 and category 2 park units are available for five units (Big Thicket National Preserve, Glen Canyon National Recreation Area, Great Sand Dunes National Park and Preserve, Lake Meredith National Recreation Area, and Everglades National Park). Daytime ambient noise levels at these units range from approximately 17 dBA at Great Sand Dunes National Park and Preserve to approximately 35 dBA at Everglades National Park (see “Chapter 3: Affected Environment”).

Modeled data describing natural ambient sound levels are available for all category 1 and category 2 park units. Daytime ambient noise levels from this analysis range from 23.6 dBA at Great Sand Dunes National Park and Preserve to approximately 39.4 dBA at Big South Fork National River and Recreation Area.

Compared to this range of measured ambient noise levels within park units of 17 to 35 dBA, and considering a worst case condition of a hard, flat surface and no intervening vegetation, drilling and production noise levels could still exceed 17 dBA at a distance of 20 miles from such equipment. However, as identified in chapter 3, under typical conditions where the surface is soft and vegetation is present, noise levels would decrease at a rate of approximately 7.5 dB or more per doubling of distance. At a distance of 12,000 to 25,000 feet (2.3 to 4.7 miles), sound levels would start to decrease to natural ambient sound levels, although under conditions where little vegetation occupies flat landscapes, this distance could be as much as 10 miles or more, and the low frequency component of sounds may be audible even further. Actual sound levels produced during site access and well pad preparation activities would be highly dependent, however, on the number of pieces of equipment used, combinations of equipment used in conjunction with one another, and the percentage of time the equipment is operating at full power. Additionally, actual noise levels at a distance from the sound sources would vary considerably depending on the frequency and amplitude of the sound, topographic features, surface conditions and the types and density of vegetation cover.

After establishing access to the site and prepping the well pad, mobilizing the drill rig and beginning the drill work would elevate sound levels. Specifically, hauling the drill rig and other equipment to the location would require about 10 to 25 large truckloads, thereby resulting in a temporary increase in vehicular sources of sound. Diesel trucks operating around the site typically produce a noise level of 88 dBA at 50 feet, which would begin to decrease to the natural ambient sound levels at a distance of 12,000 to 25,000 feet (2.3 to 4.7 miles), without considering attenuation from intervening topography, vegetation, and terrain. Elevated noise levels would also arise during drilling, which is a continuous, 24-hour-a-day, 7-day-a-week operation. Rotary drilling is used almost universally in modern drilling. Based on the noise levels indicated in table 61, noise from a rotary drill would begin to attenuate to approximately 33 dBA at a distance of 6,400 feet (1.2 miles), not accounting for additional attenuating factors such as vegetation and topography. As described above, vegetation, certain meteorological conditions, and topography could reduce the distance at which noise levels from heavy construction equipment would attenuate to the natural ambient level. Although noise levels associated with drilling operation equipment are similar to noise levels produced by construction and earthmoving equipment during the site access and well pad prepping activities, the intensity of the impacts during drilling would potentially be greater due to the continuous nature of the drilling operation. If the drilled wells are advanced to the production stage, the use of heavy construction equipment to lay pipelines would result in elevated sound levels similar to those described above for the site access, preparation, and drilling.

The production phase would necessitate the use of some equipment that produces considerable amounts of noise, including gas compressors and jack pumps. Noise from compressors (approximately 89 dBA at 50 feet), attenuating at 7.5 dB per doubling of distance, would be approximately 37 dBA at 6,400 feet and noise from jack pumps (approximately 82 dBA at 50 feet) would be approximately 30 dBA at 6,400 feet. These impacts would be continuous and long term, as pumping or gas compression would occur continuously over the life of the well. Additionally, over the course of time that the well is in production, well servicing and workover operations may be necessary. Depending on the maintenance necessary, well servicing may last only 1 or 2 days, requiring minor equipment and a workover rig (a scaled-down drilling rig). Major workover operations may last more than a month and could require some limited drilling operations.

Impacts of Plugging and Reclamation

In addition to the exploration, construction and production phases, oil and gas extraction activities would generate noise in the plugging and reclamation phase. Activities associated with this phase that would potentially result in adverse impacts include the use of heavy construction equipment and trucks to reopen and repair access roads, remove production equipment and plug wells, and restore contours. Specifically, typical equipment used in opening up and/or repairing access roads includes a small bulldozer, backhoe, and hand tools (gas-powered chainsaw, shovels, axes, etc.). As indicated in table 61, bulldozers and chainsaws could produce 85 dBA at a distance of 50 feet from the source, while a backhoe would produce a sound level of 80 dBA (FHWA 2006). If a chainsaw and bulldozer were used concurrently, generating sound levels of approximately 88 dBA, sound levels would begin to decrease to approximately 36 dBA at a distance of 6,400 feet, although attenuating factors including vegetation and topography could reduce this distance. Reopening and/or repair of access roads would likely be short term, lasting only a few days to weeks, depending on the condition of the roads. During reclamation, similar earthmoving equipment would be necessary in addition to a small dump truck for the potential removal of contaminated soils. The dump truck would produce noise levels similar to that of the earthmoving equipment. Depending on the degree of contamination at the well site, reclamation could last a few days to a few years. During plugging, trucks and cement mixer and/or pumping trucks would be used, producing similar noise levels to the earthmoving equipment used during site access and reclamation. Plugging would be short term, lasting only 2 to 5 days, depending on the equipment in the well, wellbore conditions, number of plugs to be set, and other factors. Additional sources of noise associated with this phase would include the use of ORVs or pick-up trucks to transport people and supplies.

Regulated Operations (Current and Future)

Activities inherent in oil and gas development would result in impacts on natural soundscapes and the acoustic environment. Impacts that would occur from ongoing or future permitted oil and gas production operations include those described above under “Typical Impacts of Oil and Gas Operations on Natural Soundscapes and Acoustic Environment.” The primary effects of oil and gas operations derive from sound generated by equipment, and these impacts are experienced at considerable distances from the source, depending on those factors outlined above. Within these distances, potential impacts include the degradation of visitor experience, especially in areas where a natural soundscape is desired, and impacts to wildlife such as avoidance and reduced listening area. Current data indicate that there are 215 wells under plans of operation in the category 1 park units. Assuming the noise from gas compressors would be approximately 37 dBA at 6,400 feet from one source, and noise from pump jacks would be approximately 30 dBA at 6,400 feet from one source, many acres of lands characterized by natural sounds could be adversely affected from noise associated with oil and gas operations. The specific acreage that would be impacted by existing and new production operations will depend on the equipment used and the frequency and amplitude of the sound from the equipment, as well as topographic features, surface conditions, the types and density of vegetation cover at the parks, and the ambient sound level at the well locations. However, given the estimated distances described above, it can be expected that several thousand feet of park units would be impacted by noise from development and operation of regulated facilities.

Under alternative A, implementation of the technologically feasible least damaging methods standard and the mitigation measures specifically identified to reduce noise associated with drilling and production, the degree of impacts would be reduced. Regulated operations are subject to the 9B regulations, which require that operating standards be met. Current operating standards and mitigation included with permitted wells require a 500-foot setback for noise sensitive areas and siting the well pads so they are screened from view by vegetation and topography if possible, which would attenuate noise. The 500-foot setback would also result in reducing the adverse impacts on visitors from drilling rig and production

noise, but areas close to the wells would still experience some of these impacts. An additional mitigation measure would include the scheduling of work during times least likely to affect noise sensitive species and threatened and endangered species. Such mitigation would reduce noise-related impacts on wildlife and would also provide noise-free periods. Recommended mitigation measures that would avoid high visitor use areas or sensitive habitat, impose time stipulations, reduce vehicle speeds, and require the proper maintenance of equipment, as described in the NPS Operators Handbook (NPS 2006b), would reduce human-induced sound levels as well as the extent of elevated sound levels throughout the park.

Additional mitigation measures recommended specifically for the drilling and operation phase include avoiding direct impacts by siting surface operations outside the boundaries of the park units. This mitigation measure is applicable to both directionally drilled wells and production facilities and would potentially reduce the degree of impacts, depending on the location of drilling and production facilities relative to the park boundaries. Further, mitigation measures to reduce the duration of operations in order to minimize impacts on wildlife would also reduce the magnitude of impacts on natural soundscapes and the acoustic environment. Considering that loud, heavy construction equipment is typically used for the construction of new roads, the use of existing roadways would also substantially reduce the degree of impacts. Additional mitigation measures specific to the drilling and production phase that would potentially reduce the degree and extent of impacts by reducing sound levels at the source include: the use of electric motors rather than diesel engines; the incorporation of sound-absorbing materials and/or mufflers; placing enclosures around loud equipment and/or earthen berms situated between the sound source and receptors.

In general, considering the implementation of mitigation measures and given the temporary nature of activities within the drilling phase (constructing the access roads and preparing the well pads would last several weeks to a month), the nature of construction equipment to be used, and the extent throughout the park units to which sound levels would remain above natural ambient noise levels, impacts would be short term and adverse. Adverse impacts associated with the production phase would be long term, as production would continue to occur until the wells are depleted.

Impacts on natural soundscapes and the acoustic environment from currently regulated and future operations also include the effects of geophysical (seismic) surveys that are conducted within the category 1 park units and may be conducted in category 2 park units. From 1998 to 2012, 20 seismic surveys were conducted in 6 parks for an average of 1.4 surveys per year. All but one were 3-dimensional seismic surveys covering large geographic areas. Going forward, the level of seismic activity is expected to taper off to about one proposed survey per year (NPS 2013). Impacts of these surveys include those described above under “Typical Impacts of Oil and Gas Operations on Natural Soundscapes and Acoustic Environment.” The exact extent of the surveys would vary from operation to operation and would need to be assessed on a case-by-case basis. However, under the current process for approval of seismic operations, mitigation measures that would minimize noise impacts include a 500-foot setback from noise sensitive areas.

Using recommended mitigation measures applicable to geophysical exploration would potentially reduce the degree of impacts from currently regulated oil and gas operations. These measures include prohibitions on oil and gas operations within 500 feet of any structure or facility (excluding roads) used for unit interpretation, public recreation or for administration of the unit. If applied, any recommended mitigation measures that would avoid high visitor use areas, impose time stipulations, reduce vehicle speeds, and require the proper maintenance of equipment would reduce noise impacts to park visitors. These recommendations, which are described in the NPS Operators Handbook (NPS 2006b), would reduce human-induced noise levels as well as the extent of elevated sound levels throughout the park. Additionally, such measures would provide temporary noise-free periods. With the implementation of mitigation measures coupled with the expected short-duration and intermittent sources of elevated noise

levels, impacts on the soundscape and acoustic environment from human-induced noise sources would be reduced. Impacts would mainly occur in areas at a short distance from the geophysical surveys, where noise could be occasionally discernible.

Oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, including some that were designated to protect the experience of park soundscapes in addition to other visitor uses. For example, a 500-foot setback for geophysical exploration and a 1,500-foot setback for drilling and production would be established for visitor use and administrative areas at Big South Fork National River and Recreation Area under the oil and gas management plan framework unless other mitigation that protects SMA resources and values is included and authorized in an approved plan of operations (NPS 2012b). Under the Big Thicket National Preserve oil and gas management plan, the “Visitor Use, Administrative and Other Use Areas SMA” includes 26 day use areas, 9 trails, multiple canoe routes and administrative areas, 3 cemeteries, and 2 private residential sites, all with 500- to 1,500-foot setbacks, depending on the operation. (NPS 2005). Under the oil and gas management plan for Lake Meredith National Recreation Area, a “No Surface Use” stipulation, where new non-federal oil and gas operations would not be permitted, would apply to several “Visitor Use and Administrative Areas SMAs,” including the following: 2 information stations located in the parks; 16 day and overnight use areas; 2 trails; 1 Canadian River Municipal Water Authority administrative area; and 2 park administrative areas that also serve as information stations; these all have 500- to 1,500-foot setbacks depending on the mitigation measures used. (NPS 2002b). At Padre Island National Seashore, the oil and gas management plan identifies several sensitive resource areas totaling 1,168 acres to be closed to surface access associated with non-federal oil and gas operations, including: the Malaquite Visitor Center and RV Campground, Bird Island Basin, and the Grasslands Nature Trail (NPS 2000b). The permitting of future plans of operations within these park units would be subject to these SMA setbacks or other restrictions, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

When current operations end and wells are plugged and sites are reclaimed, impacts on natural soundscapes and the acoustic environment would be as described under “Typical Impacts of Oil and Gas Operations on Natural Soundscapes and Acoustic Environment.” Current projections are that about 4 existing wells per year would be plugged and reclaimed (NPS 2013). Provisions in the current regulations and approval process for well plugging ensure that sites are reclaimed properly and left in a clean and safe condition. Well plugging and surface reclamation would result in the sites being restored to natural contours and revegetated, the wells properly plugged, and all equipment and wastes removed. Although earth moving equipment and crews create noise in the process of closing a well, these disturbances are temporary. Beneficial effects on natural soundscapes and the acoustic environment result from closing a well, as after the work is done, the site is restored to its natural condition and production noise ceases. Although adverse short-term noise impacts would occur during closing, beneficial impacts of plugging and reclamation would be realized over the long term.

Currently Exempt Operations

Under the no-action alternative, existing and future “access-exempt” operations and existing grandfathered operations would also result in impacts on natural soundscapes and the acoustic environment, and these impacts are often more extensive or more severe compared to impacts that occur from regulated operations, because exempt operations are not subject to NPS operating standards and mitigation measures that would serve to remove or reduce impacts.

The following discussion provides more site-specific detail of the current and potential impacts on natural soundscapes and the acoustic environment from activities associated with these currently exempt operations. Currently there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. Impacts on natural soundscapes and the acoustic environment that would occur from ongoing exempt operations include those described above under “Typical Impacts of Oil and Gas Operations on Natural Soundscapes and Acoustic Environment.” However, because these operations are not fully regulated, there is a higher level of risk of impacts from the proximity of wells to and the acoustic environment areas and the lack of noise abatement requirements which may result in higher noise levels experienced by visitors and the acoustic environment. Similar to regulated operations, the primary effects on natural soundscapes and the acoustic environment from exempt oil and gas operations stem from the noise associated with an industrial use in a park setting. These impacts would last until reclamation is complete. Both grandfathered and access-exempt operations would present similar impacts, although the access-exempt operations may be farther removed from visitors because they are on private property, which may be fenced or otherwise secured and not as accessible as the surrounding national park lands.

For access-exempt operations, the impact on natural soundscapes and the acoustic environment would depend on the attenuation distance between sound sources and noise sensitive resources in the park boundary. It has been relatively rare that a new operation, such as new well drilling, can occur in a park without using some degree of access on, across, or through federally owned or controlled lands or waters. New drilling on private lands inside park boundaries has been limited to a few wells on private property in Big South Fork National River and Recreation Area and one well at Cuyahoga Valley National Park. However, as noted in “Geology and Soils,” shale development could expand the number of parks affected by non-federal oil and gas development and could include parks where there is little federal surface ownership. For example, there could be a large number of new wells developing the Marcellus shale within the Upper Delaware Scenic and Recreation River, where land ownership is private. Extraction operations located both inside and outside the park unit could result in direct impacts on natural soundscapes and acoustic environment, depending on the well location relative to the park boundary.

Table 56 in the “Visitor Use and Experience” section presents site-specific information regarding proximity of exempt operations to visitor use areas (based on geospatial analysis of information obtained from the parks). This can be used to estimate noise impacts from these operations. Other considerations such as wildlife behavior, wildlife habitat, cultural soundscapes, the intrinsic acoustic environment, and overall soundscape were not considered in the site-specific analysis.

As noted in table 56, there are currently 319 exempt operations in category 1 park units, 43 of which are within 500 feet of visitor use areas. Visitor use areas within a 500-foot distance of exempt wells include trails, campgrounds, visitor centers, and other areas designated for visitor use such as scenic overlooks and interpretive sites. Not all areas used by visitors were included in each park’s database, therefore the figures underestimate the potential impacts on visitor experience of being able to hear oil and gas operations. For example, at Cuyahoga Valley, there are 40 documented visitor use areas within 500 feet of exempt operations. These include 29 buildings that are not specifically identified in the park’s database, 1 monument, and 10 trails or connector routes (see appendix C). Visitors using these areas would be able to hear most noise from oil and gas operations, given predicted noise levels at that distance (see table 61). As noted in table 61, at 400–800 feet, most noise sources from oil and gas operations would be expected to reach the 50–60 dB range, which is well over the predicted maximum ambient daytime sound level for the park of 38.1 dB (see table 24 in chapter 3). Similar circumstances would be expected at other parks. Also, although the database used did not include many visitor use areas near exempt operations at Big South Fork National River and Recreation Area, as noted in the Big South Fork oil and gas management plan (NPS 2012b), many oil and gas access roads are also used for recreational

trails and drill rigs may be visible from several areas of the park including boats on the rivers. This means that the well operations can likely be heard from that distance, depending on intervening topography.

Directional Drilling

Under the no-action alternative, the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units reduces impacts to the soundscape of the parks by displacing a source of noise to a location outside the park. However, wells directionally drilled and produced from outside park units to bottomholes beneath the park units would impact the acoustic environment of adjacent land owners and could substantially impact the acoustic environment in the park if close to the park boundary. Under the 9B regulations, the NPS cannot require preventative mitigation measures even if operations may indirectly affect park resources by their proximity to the park. For example, depending on the level of noise generated and the topographic and vegetation conditions, and the ambient noise levels, the noise from a well located at the park boundary could carry many miles into the park before reducing to the background level (see analysis above). The intensity of impacts would depend on proximity of operations to the park units; site specific environmental conditions, such as those identified above, and mitigation measures, or lack thereof, being employed.

Financial Assurance

There would be no impacts on natural soundscapes and the acoustic environment as a result of financial assurance provisions under alternative A.

Financial Liability of Operators / Transfer of Interest

There would be no impacts on natural soundscapes and the acoustic environment as a result of provisions relating to the financial liability of operators or transfer of interest under alternative A.

Enforcement and Penalties

Under the no-action alternative the absence of penalties for minor acts of noncompliance would result in the continued lack of incentive for operators to comply fully with NPS operating standards, such as installing mufflers or equipment with lower noise levels. This increased the risk of unnecessary impacts on natural soundscapes and the acoustic environment.

Compensation for Privileged Access across Federally Owned Land

There would be no impacts on natural soundscapes and the acoustic environment as a result of provisions relating to compensation for privileged access across federally owned land under alternative A.

Cost Recovery

Under the no-action alternative, the lack of cost recovery could have an indirect adverse impact on natural soundscapes and the acoustic environment because additional money collected to support NPS permitting, monitoring, and compliance programs could be used to improve or protect park resources and could be applied to increased monitoring and evaluation of operations, such as ensuring that operations are meeting proper maintenance requirements to reduce noise. Therefore, the non-recovery of costs under the no-action alternative would result in adverse impacts on natural soundscapes and the acoustic environment.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect soundscapes and the acoustic environment of the parks. Management planning, such as fire management, vegetation management, ORV, and oil and gas management plans, can result in greater protection for these resources. Conversely, actions that cause disturbance of these resources would include activities such as prescribed burns, ORV use, mining, agricultural and logging activities, as well as any general development activities that include excavation, grading, or construction. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on natural soundscapes and the acoustic environment in the area of analysis (including both park lands and adjacent lands) and a brief summary of the cumulative impacts of these actions on natural soundscapes and the acoustic environment are listed in table 62.

TABLE 62. CUMULATIVE IMPACTS ON NATURAL SOUNDSCAPES AND ACOUSTIC ENVIRONMENT (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Natural Soundscapes and Acoustic Environment
Prescribed fires and fire management actions	Short-term adverse effects due to removal of vegetation that may be attenuating noise and noise related to firefighting actions. Long-term beneficial effects of improved noise attenuation from vegetative cover that is established after these treatments.
NPS facility and road construction	Short-term and long-term adverse effects on soundscapes during road grading and construction using heavy equipment.
Vegetation management	Short-term adverse effects due to removal of vegetation that may be attenuating noise and noise related to firefighting actions. Long-term beneficial effects of improved sound attenuation from vegetative cover that is established after these treatments.
Trails development and maintenance	Short-term and long-term adverse effects on natural soundscapes and the acoustic environment during road grading and construction using heavy equipment.
ORV use	Long-term beneficial effects from improved vegetative cover due to increased noise attenuation.
Abandoned mine lands reclamation	Short-term adverse effects on natural soundscapes and the acoustic environment during clearing, grading, and surfacing of trails, and removal of vegetation in trail footprint.
Mining and logging activities	Short- and long-term adverse effects on natural soundscapes and the acoustic environment due to mobile sources of noise capable of affecting large areas.
Recreational use	Short-term adverse effects on natural soundscapes and the acoustic environment due to reclamation-related noise. Long-term beneficial effects of improved surface vegetation, removal of noise sources, and related noise attenuation.
Ranching, agricultural land uses	Short-term adverse effects due to noise from mining and logging machinery. Long-term adverse effects on natural soundscapes and the acoustic environment due to loss of noise-attenuating vegetation.
Land development: residential and nonresidential (commercial, industrial) land uses, including road construction	Short- and long-term adverse effects soundscapes and the acoustic environment from human activities.

Past, Present, and Reasonably Foreseeable Activity	Impacts on Natural Soundscapes and Acoustic Environment
Future oil and gas development on adjacent lands	Short- and long-term adverse effects on natural soundscapes and the acoustic environment from operations that remove vegetation cover and the associated noise-attenuating effects.
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term adverse effects on natural soundscapes and the acoustic environment due to construction equipment noise, and possible long-term adverse effects on natural soundscapes and the acoustic environment due to the introduction of noise generators.
Industrial operations outside park boundaries	Long-term adverse impacts from noise generated by industrial activity, especially that from surface mineral extraction activities and manufacturing.
Traffic noise	Long-term adverse impacts due to increasing visitorship to parks and increased travel to and from developments near park boundaries.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 63 includes an accounting of cumulative impacts that could affect soundscapes and the acoustic environment in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 63. CUMULATIVE IMPACTS ON NATURAL SOUNDSCAPES AND ACOUSTIC ENVIRONMENT – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Grazing; agricultural activities; residential development; road building; irrigation; visitor activities within the park.	Residential development and road building activities could create temporary construction noise impacts and permanent noise impacts, depending on the location of the activity, duration and amplitude of the sound, and the use area.
Big South Fork National River and Recreation Area	Actions include agricultural and forestry operations; commercial and residential development; road construction; existing and future coal mining operations; visitor use; prescribed fires; plugging and reclamation of abandoned wells including 39 under ARRA funded program; noise from roads in and around park.	If agricultural or forestry activities involve replacement of dense natural vegetation with grazing or other low-to-the-ground crops, or thinning of tree cover, negative impacts would result due to the loss of vegetative cover and loss of the noise-attenuating effect of this vegetative cover. Construction noise associated with development and extraction activities, including reclamation of abandoned wells, could result in temporary noise impacts. Increases in traffic volumes associated with development and greater visitorship would increase noise levels in and around park.
Big Thicket National Preserve	Actions include agricultural and forestry operations; urban and residential development; publicly owned facilities (water impoundments, water diversion structures, and sewage treatment); road construction; visitor use; plugging of abandoned wells under ARRA funded program noise from roads in and around park.	If agricultural or forestry activities involve replacement of dense natural vegetation with grazing or other low-to-the-ground crops, or thinning of tree cover, negative impacts would result due to the loss of vegetative cover and loss of the noise-attenuating effect of this vegetative cover. Construction noise associated with development and extraction activities, including reclamation of abandoned wells, could result in temporary noise impacts. Increases in traffic volumes associated with development and greater visitorship would increase noise levels in and around park.

Park Unit	Cumulative Actions	Description of Impacts
Cumberland Gap National Historic Park	Park developments and visitor use; establishment of nearby State Parks. Continued management of recommended wilderness in accordance with Wilderness Act and NPS policies; acquisition of Fern Lake and surrounding area.	Construction of park facilities and improvements to visitor use areas would generate temporary noise impacts. Acquisition of additional land could result in positive impacts due to removal of potential noise sources.
Cuyahoga Valley National Park	Residential, commercial, and transportation related land development and construction outside the park; ongoing park operations and maintenance. Invasive and nonnative species management inside and outside of the park; land acquisitions and easements; agricultural use noise from roads in and around park and nearby developments, commercial and industrial uses.	Construction noise from development activities, including residential and commercial building and road construction would generate temporary noise impacts, while increased commercial and industrial activity and traffic could generate permanent noise impacts. Invasive species control could generate short-term minor adverse impacts, depending on the equipment used and timing of activity. Land acquisition could result in long-term positive impacts by negating or controlling future development on acquired land.
Gauley River National Recreation Area	Urban development. Transportation infrastructure improvements; mined land reclamation.	Construction noise from development and road building could result in short-term adverse impact on natural soundscapes and the acoustic environment at use areas within the park. Operation of some facilities and increased traffic associated with new developments could generate permanent impacts on noise levels. Heavy construction equipment needed for mined land reclamation would result in short-term adverse impacts. However, revegetation of reclaimed land would result in long-term positive impacts by reintroducing natural sounds.
Lake Meredith National Recreation Area	Actions include recreational activities; ranching and agriculture; residential development; road construction; water impoundments (i.e., Lake Meredith); recreational ORV use and other visitor use including boats, personal watercrafts.	Increases in recreational activities involving motorized vehicles and water craft would result in noise levels above existing levels. Construction activity associated with residential development and road building would generate temporary impacts on visitor enjoyment, depending on the location of the source, duration and amplitude of the sound, and the use area.
New River Gorge National River	Urban development. Transportation infrastructure improvements; mined land reclamation.	Construction noise from development and road building could result in short-term adverse impact on natural soundscapes and the acoustic environment at use areas within the park. Operation of some facilities and increased traffic associated with new developments could generate permanent impacts on noise levels. Heavy construction equipment needed for mined land reclamation would result in short-term adverse impacts. However, revegetation of reclaimed land would result in long-term positive impacts by reintroducing natural sounds.
Obed Wild and Scenic River	Catastrophic release.	Noise generated by cleanup equipment and site access would result in a temporary increase in noise levels that would contribute to short-term cumulative noise impacts during the cleanup.

Overall, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated

operations would have a beneficial impact on natural soundscapes and the acoustic environment in all category 1 and 2 park units, while exempt operations would cause adverse impacts stemming primarily from the current lack of regulation. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development occurring in the broader study area and the other cumulative actions affecting the resource in the entire study area.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in measurable impacts. Impacts on natural soundscapes and the acoustic environment from permitted operations would be as described for alternative A, no action.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations would reduce noise levels if mitigation can be applied to the existing operations, but may not substantially change the impacts from noise of wells that are located close to noise sensitive areas. Wells would not be relocated, but steps such as adding muffling devices and noise barriers, lubricating and repairing equipment, and adding vegetation screens could serve to mitigate some noise impacts on visitors. If conditions were severely adverse for grandfathered operations, steps would have been taken earlier under the “imminent threat” provision to apply mitigation, and that did not occur. There would still be the presence of an industrial operation at the well locations, with impacts on natural soundscapes and the acoustic environment that will affect some, but not all, visitors to the parks, depending on the visitor’s sensitivity to the noise and the desired experience. Industrial operations will also impact wildlife behavior, wildlife habitat, and the intrinsic acoustic environment. Impacts to the soundscape and acoustic environment from workovers and production would also continue; however, the change in regulation would reduce indirect impacts and the risks of impacts on the soundscape and acoustic environment from oil and gas operations because of the implementation of better operating practices, resulting in long-term beneficial impacts. Once the rule change is implemented, these operations would need to meet the least damaging standard that incorporates mitigation measures and the operating standards that are spelled out in the regulations. The operating standards that would now apply to previously exempt operations include, but are not limited to the use of muffling devices and noise barriers, and directing noise away from noise sensitive areas if possible. Additional mitigation measures could include planting vegetation between the noise source and the use area, and improvements to existing equipment or replacement of existing equipment with newer, quieter equipment. For example, the well inspection reports for Cuyahoga Valley and Big South Fork National River and Recreation Area indicate that there were 4 sites with noises emanating from wellheads at Cuyahoga Valley and 2 sites with noise from production equipment at Big South Fork. Maintenance and repairs on the wellheads or other equipment would be expected to reduce or eliminate impacts to the acoustic environment.

As previously discussed, oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These

plans establish recommended setbacks for oil and gas operations from SMAs that include noise-sensitive areas such as cultural landscapes, visitor use areas, and trails. The permitting of future plans of operations within these park units would be subject to these SMA setback recommendations, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Looking at site-specific information available for the nine parks with previously exempt operations, under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. As a result, beneficial effects would occur to natural soundscapes and acoustic environment as a result of the implementing technologically feasible least damaging methods standard allowing a proposed clause “reasonable mitigation of the visual and sound impacts of oil and gas operations on the soundscape and acoustic environment and related resources.” Information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting park resources, including soundscapes and the acoustic environment. Regulatory oversight under alternative B would also require that precautions be taken where possible to prevent impacts. Such precautions include establishing a 500-foot buffer between production equipment and noise sensitive areas and siting the equipment so it is screened by vegetation and topography if possible, both of which would attenuate noise. Operators could be required to enclose noisy equipment or install noise barriers (provided they would not create adverse aesthetic impacts), conduct proper maintenance of equipment or replace noisy equipment with less noisy equipment, and would be required to limit noise impacts during decommissioning of extraction facilities.

Bringing currently exempt oil and gas operations under the 9B regulations would result in a reduction in the severity of adverse impacts on natural soundscapes and the acoustic environment from oil and gas operations, particularly at locations where only natural sounds are desired. Therefore, alternative B would result in long-term, direct beneficial impacts on natural soundscapes and the acoustic environment.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B, impacts on natural soundscapes and acoustic environment would be the same as described under alternative A.

Financial Assurance

There would be no impacts on natural soundscapes and acoustic environment as a result of provisions relating to financial assurance under alternative B, because the bonding amount and the reclamation timing would not change site noise levels.

Financial Liability of Operators / Transfer of Interest

Impacts on natural soundscapes and acoustic environment are not generally tied to financial liability of operators, so this provision would have no impact on soundscapes or noise levels, resulting in no impacts on natural soundscapes and acoustic environment.

Enforcement and Penalties

Under alternative B, the new penalty provision that would be established would provide incentives for an operator to comply with the 9B regulations. That would, in turn, facilitate protection of park resources and values, including natural soundscapes and acoustic environment, resulting in a long-term indirect beneficial impact compared to the existing condition.

Compensation for Access across Federally Owned Land

Under alternative B, compensatory reclamation activities that are done in lieu of an access fee would likely require the use of heavy equipment and therefore would have short-term and very minor adverse impacts on natural soundscapes and acoustic environment. However, long-term beneficial impacts on soundscapes would be expected due to these reclamation projects, which would re-introduce natural sounds to the soundscape. Over the long-term, beneficial impacts on the soundscape and acoustic environment would accrue from reclamation measures employed under alternative B, compared to the existing condition.

Cost Recovery

Under alternative B increased monitoring and evaluation of operations would allow for NPS to detect potential problems such as poor maintenance on jack pumps or gas compressors, creating unnecessary noise, thereby avoiding potential impacts. While permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to natural soundscapes and the acoustic environment to the extent these funds were applied to increased monitoring and evaluation of operations. As a result, under alternative B, cost recovery could have a beneficial impact on natural soundscapes and the acoustic environment compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, both adverse and beneficial cumulative impacts would occur from projects, plans and actions and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on natural soundscapes and the acoustic environment, as described in the above analysis. Bringing previously exempt operations under regulation would add substantial beneficial impacts to natural soundscapes and the acoustic environment. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead

to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on natural soundscapes and the acoustic environment from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

Compared to the existing condition, granting an exemption from the operations permit requirements would not substantially change the impacts from noise from wells that are located relatively close to noise sensitive areas. Wells would not be relocated unless impacts were extremely severe and could not be mitigated, and it is not expected that would occur for any of the previously exempt wells. By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on the natural soundscapes and acoustic environment at the site-specific level of analysis.

Directional Drilling

The regulation of directionally drilled wells under alternative C, may potentially remove a key incentive for operators to locate operations outside of park units. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed (O'Dell pers. comm. 2013d) (see the "Socioeconomics" section). As a result of the changes in alternative C, operators may be more likely to select locations within park unit boundaries, thereby intensifying direct impacts on park resources, including soundscapes and the acoustic environment. If surface locations are sited within the park unit boundaries, adverse effects on natural soundscapes and the acoustic environment would include those impacts previously described under "Typical Impacts of Oil and Gas Operations on Natural Soundscapes and Acoustic Environment" and include noise from the exploration phases and drilling and production (including periodic workovers) phases of extraction activities. The areal extent of impacts would depend on the topography, land cover of the location selected, frequency, duration and amplitude of the sound, and proximity to noise sensitive areas. Considering a well location within the park boundaries, noise radiating out in all directions to a distance predicated by geographical conditions could impact a larger area or perhaps more sensitive area within the park than would noise generated under similar geographical conditions near, but outside, the park boundaries, but relative impacts would depend on noise suppression used and location of sensitive resources.

Therefore, alternative C could create additional long-term direct adverse impacts to soundscapes within park units compared to the existing condition. However, a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision could create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, could facilitate maintenance or repair of production equipment and could minimize noise, resulting in a long-term indirect beneficial impacts on natural soundscapes and the acoustic environment.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, there would also be effects that would occur as a result of oil and gas operations that would continue to affect soundscapes and the acoustic environment where impacts cannot be avoided, and benefits from bringing previously exempt operations under regulations and the resultant reduction in adverse impacts, as described in the alternative B analysis. Alternative C would contribute to beneficial cumulative impacts through bringing previously exempt operations under regulation, and adverse cumulative impacts from the change in directional drilling regulations that could result in more oil and gas development within park units as opposed to outside park boundaries. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on natural soundscapes and the acoustic environment from the existing condition. Continuing impacts on natural soundscapes and the acoustic environment from regulated and exempt operations would be expected. Impacts would be as described in the analysis, with an increased risk of more severe or extensive adverse impacts from access-exempt or grandfathered sites unless those sites changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations would result in impacts such as poorly maintained and noisy production equipment and lack of mitigating features (e.g., mufflers, noise barriers, enclosures, retrofits, quieter equipment). As a result, there would be continuing impacts from ongoing oil and gas activities occurring within the park units. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal and generally localized effects on natural soundscapes and the acoustic environment. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks. The absence of penalties under existing conditions would result in a continued lack of incentive for operators to meet NPS operating standards, such as installing mufflers or equipment with lower noise levels. This could result in more intense impacts on natural soundscapes and the acoustic environment. Because adverse impacts under alternative A would not mask the natural soundscapes over most of the park units and be generally localized and intermittent or temporary in nature, these impacts would not be significant.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on natural soundscapes and the acoustic environment in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects as described above would accrue from the continued unregulated operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term beneficial impacts on natural soundscapes and the acoustic environment, compared to the existing condition. Benefits would

accrue primarily from the increased ability on the part of NPS to request and enforce the least damaging standard (as opposed to no standards) including proper maintenance of production equipment and placement of noise mitigation measures (e.g., mufflers, noise barriers, enclosures, retrofits, quieter equipment). This would result in fewer noise and sound impacts. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. Overall these regulatory improvements would result in long-term beneficial impacts on natural soundscapes and the acoustic environment compared to the existing condition. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would result in localized, intermittent and/or temporary disturbance to park soundscapes, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations. Adverse impacts of oil and gas development would be mostly intermittent and localized and would not be significant. Adverse cumulative effects of the intermittent and localized noise from oil and gas operations would not be significant.

Alternative C

Under alternative C, when compared to the existing condition, impacts of the regulatory changes would be primarily beneficial, as described for alternative B. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells (operations located wholly on non-federally owned lands but still within the boundary of a park unit) not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands and resources, including soundscapes and the acoustic environment. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts on natural soundscapes and the acoustic environment. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts from poorly maintained and noisy production equipment and lack of mitigating features (e.g., mufflers, noise barriers, enclosures, retrofits, quieter equipment) within park boundaries, following the removal of regulatory incentives to locate operations outside of the park units. Therefore, alternative C could create additional long-term, direct adverse impacts to natural soundscapes and the acoustic environment within park units compared to the existing condition, although these impacts would be localized and small in number. Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on natural soundscapes and the acoustic environment, primarily from bringing previously exempt operations under regulation. Because alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would result in localized, intermittent and/or temporary disturbance to park soundscapes, the impacts of this alternative would not be significant.

Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial. Adverse impacts of oil and gas development would be mostly intermittent and localized and would not be significant.

CULTURAL RESOURCES

METHODOLOGY

Potential impacts on cultural resources are assessed based on the actions being proposed and the various cultural resources present at the NPS parks, with attention to characteristics that may have an adverse effect upon the integrity of cultural resources. Resource-specific context for assessing impacts of the alternatives on cultural resources include:

- The type and amount of disturbance from oil and gas operations (such as type and location of well pads and access roads).
- The type of cultural resources affected and their susceptibility to disturbance, contamination, and noise or visual intrusion. Avoiding the destruction of a historic structure or an archeological site of modest size and defined boundaries could be expected to be relatively easy, while the issues posed by an extensive cultural landscape or ethnographic zone could be more problematic.

For the programmatic analysis, a qualitative analysis of the potential impacts of oil and gas operations on cultural resources was conducted based on actual experience of the NPS in management of non-federal oil and gas operations and their effects cultural resources and professional judgment. For site-specific analysis, locations of the well pads of exempt operations were mapped relative to concentrated areas of cultural resources if this information was available in the parks' geospatial databases to assess impacts of those operations. Site contamination was also considered in the site-specific analysis.

IMPACTS OF ALTERNATIVE A: NO ACTION

The following is a discussion of the potential adverse impacts on one or more subcategories of cultural resource that oil and gas operations might cause. It is not a determination that they actually would occur, mitigation and consultation under section 106 are discussed under the "Regulated Operations (Current and Future)" section. Note that all currently regulated operations have been evaluated for compliance with section 106, and subjected to consultation if required.

Typical Impacts of Oil and Gas Operations on Cultural Resources

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on cultural resources result primarily from the presence of seismic survey crews in and around the park, and the presence and detonation of explosives.

Historic Structures—Possible impacts on historic structures located within a vibration zone include cracking of foundations, breaking of glass window panes, settling and burial of artifacts located in soft soils, and collapse of structures and features due to oscillation and ground motion.

Cultural Landscapes—The presence of oil and gas personnel and their vehicles and equipment could cause adverse visual impacts for visitors that are seeking a park-like or natural experience. Flagging used to mark site lines can be distracting, and the cutting of survey lines through dense vegetation can require creation of paths for vehicles and crews and clear a line of sight that is not natural. The noise from the seismic survey operations could adversely impact how visitors experience the cultural landscape at these sites. These impacts would be localized to the seismic survey area and short-term in duration.

Archeological Resources—Impacts on archeological resources could occur as a result of the vibrations caused by truck traffic and seismic survey technology, including settling and burial of artifacts located in soft soils, and collapses of features due to oscillation and ground motion. Increased access to areas by exploration crews could lead to intentional and unintentional vandalism and illegal collection of or damage to previously unidentified cultural resources listed or eligible for listing on the National Register.

Ethnographic Resources—Seismic surveys can introduce explosives into a park environment. Visitor access is limited to areas to reduce the possibility of encounters. It is possible that the geophysical exploration in a certain location could be seen by an Indian tribe as transgressing the character of a sacred site.

Impacts of Well Drilling and Production

Similar to geophysical surveys, drilling operations are relatively short term. However, the intensity of impacts is much higher, due to the equipment and materials needed to drill a well and the potential duration of the operation, which can be a few weeks longer for hydraulic fracturing operations. Site preparation may include extensive clearing, grading, cutting, filling, and leveling of the well pad using heavy construction equipment that can destroy or disturb cultural resources. Soil material suitable for plant growth is often removed first and stockpiled for later use in reclamation. The operator may also dig reserve pits to hold large volumes of drilling mud and drill cuttings. Impacts on park cultural resources could also occur if water and sediment or contaminants were transported downslope into park units through adjacent streams, gullies, or overland flow, causing unsightly and/or unnatural conditions and providing a source of exposure to contaminated water or soils. Severity of impacts would depend on proximity of operations to the park units; site specific environmental conditions, such as steepness and direction of slope and surface hydrology; and mitigation measures being employed.

Drilling and production operations could be more substantial than other types of impacts on cultural resources, especially if well pads are placed in locations that intrude upon historic structures\districts, cultural landscapes, areas of ethnographic significance or archeological sites. Drill rigs can reach heights of 180 feet, which would most likely be visible from several locations within the parks. Initial site clearing would remove approximately 1.5 to 4 acres of vegetation for each well pad (NYDEC 2013) and access road construction would often result in visible cuts through park vegetation or creation of a definitive pathway, depending on the location and park. The operations, especially drilling, would increase the presence of work crews and equipment. As drilling is a 24-hour, 7-day a week operation, these impacts would be continuous, and could last a week or two up to a few months. Production operations entail permanent equipment arrays such as pump jacks, oil tanks, and containment apparatus. Although these have a less intrusive human presence compared to drilling, they would be visible for 20 years or longer.

All Cultural Resources—Unplanned incidents associated with oil and gas operations such as well blowouts, fires, and major spills within the boundaries of a park present a risk of release of contaminants that can adversely impact cultural resources, especially historic structures and cultural landscapes if they are in the vicinity of the release or fire. However, the incident rates for such incidents are low and are not a typical expectation of project implementation. Therefore, no matter which type of operation is used for drilling and production (conventional or fracturing), there is a reasonable expectation that long term adverse impacts from contamination would not occur or be limited to low levels of intensity, although there could be severe adverse impacts that could be considered long-term as impacts on cultural resources are generally not reversible. In the event that the park's resources or values are damaged, the NPS could seek remedy both in the form of reclamation and monetary compensation.

Historic Structures—Structures and districts potentially eligible for the National Register which have not been evaluated for National Register eligibility may be damaged by construction or operational activities associated with drilling and production. Impacts could include the visual intrusion, either temporary or permanent, of oil and gas operations and equipment into the setting of a historic structure/district; and the introduction of vibration, noise, odors, inappropriate artificial lighting, potentially detrimental gases or chemicals, and access routes into the setting of a historic structure or a historic district. Site alterations and destruction or collection of objects and structures at sites of historical, archeological, or cultural value could occur during drilling and operation activities associated with oil and gas development. Direct impacts could occur through removal, destruction or alteration of historic structures contained within a historic district. Road construction and well drilling and production may indirectly impact historic structures and districts through vibrations which may result in accelerated deterioration of the resources.

Cultural Landscapes—Impacts on cultural landscapes from drilling and production operations could include visual intrusion, either temporary or permanent, of oil and gas operations and equipment into a cultural landscape; the introduction of vibration, noise, odors, inappropriate artificial lighting, potentially detrimental gases or chemicals, and access routes into a cultural landscape; and/or the alteration or destruction of a cultural landscape during drill site preparation. It should be noted that cultural landscapes in national parks can be quite large and include many types of contributing features such as natural systems and features, circulation, spatial organization, land use, topography, buildings and structures, views and vistas, circulation patterns, vegetation, and water features. Visual impacts from drilling and production operations on cultural landscapes would be more substantial if well pads were placed relatively close to the sites, where visitors would be able to see the operation and all associated equipment and tanks. Exploratory drill rigs can reach heights of 180 feet, which would be readily visible through clearings and open spaces. The operations, especially drilling, would increase the presence of work crews and equipment. Wells that would be developed using hydraulic fracturing would involve more equipment, more traffic, and a longer period of time (2 to 4 weeks) for drilling and development. Long term adverse impacts could occur to cultural landscapes from the visual presence of well pads and associated equipment.

Archeological Resources—Potential adverse impacts on archeological resources are possible from the construction and maintenance of access roads, well pads, flowlines, and pipelines. The destruction of archeological sites from the ground disturbing activities associated with oil and gas operations and equipment, including the passage of heavy trucks over access roads, can result in long-term adverse impacts on cultural resources. Park units typically have archeological survey data from past cultural resource investigations, but they are not necessarily comprehensive, nor is it possible to accurately predict the location of all subsurface resources. Increased access to sensitive areas could contribute to intentional and unintentional vandalism and looting of artifacts. Collection of or damage to previously unidentified cultural resources potentially eligible for listing on the National Register would constitute an indirect adverse impact. As indicated above, it is possible that important cultural sites may not be visible from the surface and could be damaged by construction activities associated with drilling and production. This would have a long-term adverse impact on individual archeological sites.

Ethnographic Resources—Ethnographic resources consist mainly of the cultural values of the tribes and other communities of interest claiming traditional associations with the area. New drilling and production could result in adverse impacts on potential ethnographic resources in the absence of appropriate consultation with communities of interest. Oil and gas drilling and production occurring in areas with significance to tribes, for example, would prevent access and cause interruptions to the symbolic associations between the people and the place itself. The intrusion of oil and gas operations into an ethnographic area, particularly an Indian sacred site, or the destruction or displacement of objects of

Indian patrimony would result in adverse impacts on cultural resources, resulting in short- to long-term adverse impacts on cultural resources.

For directionally drilled wells, the location of these wells outside the park boundary means that most of the impacts addressed above would not be experienced in the park. However, if these wells are close enough to the park boundary, noise and even lighting can carry into the park, and indirect effects would be similar to those described for operations inside the park units. The risk of indirect impacts and their intensity would vary with the location of the well with respect to the park boundary.

Impacts of Plugging and Reclamation

Full-scale reclamation could include the following removal of structures, equipment and debris used or generated during operations; replanting of vegetation; removal or remediation of contaminated soils; and recontouring of disturbed areas to near original grade.

Historic Structures—Potential adverse impacts on historic structures from plugging, abandonment, and reclamation operations include the displacement of or damage to built features from vibrations and/or movement of soils containing structural remains, resulting in localized long-term adverse impacts on historic structures throughout the park.

Cultural Landscapes—The presence of earthmoving, demolition, and other equipment associated with plugging and reclamation activities would have similar impacts on cultural resources as described for drilling and production operations. The noise from the drill rigs and the sight of the work crews and their equipment could adversely affect the cultural landscape at these sites and introduce ground disturbance to the landscape. However, plugging and reclamation would end disturbances from production activities, and the sites would be restored to a more natural character. Reclamation of the well pads following plugging of the wells would serve to eliminate the unnatural views of the site over time. The actual time required to reclaim the site's scenic views would depend on many factors, including the erosion potential of the site, productivity of the vegetation, topography, and soil characteristics, including the presence of any contamination. Ultimately, the removal of the rig and associated structures and equipment, in conjunction with site reclamation, would improve the scenic views near the well sites. Reclamation of sites and replanting with native vegetation would restore the natural character of the area, and may lessen any impacts related to disturbance in cultural setting or landscape. Overall, there could be both short-term adverse impacts and long-term beneficial impacts on cultural landscapes as a result of plugging and reclamation.

Archeological Resources—The use of heavy equipment and vehicles during reclamation activities—including well plugging and shutting down, abandoning, and removing flowlines and pipelines—could disturb and compact soil, increase soil erosion, and release oil and other contaminating and hazardous substances, resulting in short-term adverse impacts. It is assumed that previously some drilled wells may have already disturbed extant cultural sites. Ultimately, the removal of the rig and associated structures and equipment, in conjunction with site reclamation, would improve the scenic views near the well sites. Reclamation of sites and replanting with native vegetation would restore the natural character of the area, and may lessen any impacts related to disturbance in cultural setting or landscape. However, during reclamation activities, it is possible that soils containing cultural material would be disturbed, thus displacing or destroying subsurface artifacts and resulting in long-term adverse impacts. Overall, there could be both short-term and long-term adverse and beneficial impacts on archeological resources as a result of plugging and reclamation.

Ethnographic Resources—As described for other phases of oil and gas development, impacts could include limited access to or use of sacred sites or effects on the physical integrity of the sites. As a result, plugging and reclamation activities would result in adverse impacts on potential ethnographic resources.

Regulated Operations (Current and Future)

Current data indicate that there are 215 wells under plans of operation in the category 1 park units. The historic average of new drilling operations is about 4 proposals per year (NPS 2013). Therefore, approximately 80 to 100 new wells may be drilled and produced in the parks over the next 20 to 30 years. Impacts on cultural resources that would occur from ongoing or future permitted oil and gas production operations include those described above under “Typical Impacts of Oil and Gas Operations on Cultural Resources.” However, regulated operations are subject to the 9B regulations, which require that operating standards be met and the application for a plan of operations be referred to the cognizant State Historic Preservation Office (SHPO) for review. The means by which section 106 and NEPA compliance is accomplished for oil and gas operations is the permitting process or submittal by the operator of a proposed plan of operations in accordance with the NPS Operators Handbook (NPS 2006b). As detailed in chapter 2 and appendix B of the NPS Operators Handbook, the permitting process places the responsibility for background data gathering, including cultural resource surveys, with the operator. The operator is responsible for complying with it including various operating standards and, possibly, special conditions. Special conditions, including those designed to achieve the avoidance, minimization, or mitigation of adverse impacts on cultural resources, may be imposed as a result of consultation with the cognizant SHPO in accordance with the 2008 NPS Programmatic Agreement governing NPS compliance with National Historic Preservation Act (NHPA). Section 106 and NEPA compliance have been completed for all existing, currently regulated wells.

Known National Register historic structures and historic districts would not be damaged by construction or operational activities associated with drilling and production because the relevant plan of operations issued in accordance with the 2008 NPS Programmatic Agreement would prevent such damages from occurring. Plans of operations typically require that operators not alter, destroy, or collect any object, structure, or site of historical, archeological, or cultural value. Historic structures and districts may also be protected from direct impacts from road construction and well drilling and production by avoidance.

Compliance with NHPA and section 106 consultation process so as to avoid, minimize, or mitigate adverse effects would be required of future drilling and production operations. The area of potential effect of the oil and gas drilling and production as a section 106 undertaking would not intersect with documented National Register historic structures and districts unless all less damaging alternatives had been exhausted. Structures and districts potentially eligible for the National Register which have not been evaluated for National Register eligibility would be professionally surveyed as part of the operator’s permit application and their status concurred in by the cognizant SHPO.

Oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs, including some that were designated to protect cultural resources. For example, a 100-foot setback from cemeteries and a 1,500-foot setback from cultural landscapes would be established for all operations at Big South Fork National River and Recreation Area under the oil and gas management plan framework unless other mitigation that protects SMA resources and values is included and authorized in an approved plan of operations (NPS 2012b). Under the Big Thicket National Preserve oil and gas management plan, the “Visitor Use, Administrative and Other Use Areas SMA” includes three cemeteries for which neighboring oil and gas activity would be subject to stipulations (NPS 2005). Under the oil and gas management plan for Lake Meredith National

Recreation Area, a “No Surface Use” stipulation, where new non-federal oil and gas operations would not be permitted, would apply to several Cultural Resources SMAs, including the “Alibates Flint Quarries National Monument SMA,” the “McBride Canyon Cultural Landscape SMA,” and the “Carbon Black Plant SMA” (NPS 2002b). At Padre Island National Seashore, the oil and gas management plan identifies several sensitive resource areas totaling 3,703 acres to be closed to surface access associated with non-federal oil and gas operations, including the Novillo, Green Hill, and Black Hill Line Camp Cultural Sites and the Mansfield Cut Archeological District (NPS 2000b). The permitting of future plans of operations within these park units would be subject to these SMA setbacks or other restrictions, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Cultural landscapes can often be protected from direct impacts from road construction and well drilling and production by avoidance. Although drilling is a 24-hour operation, the drilling phase is temporary and would have short-term adverse impacts for any type of operation. Compliance with NHPA and the 2008 NPS Programmatic Agreement including consultation with the cognizant SHPO would achieve avoidance, minimization, or mitigation of adverse effects to cultural landscapes. Similar to documented historic districts, the area of potential effect of the oil and gas drilling and production as a section 106 undertaking would not intersect with a documented cultural landscape eligible for the National Register unless all less damaging alternatives had been exhausted.

In order to protect archaeological resources for any type of operation (conventional or fracturing), the NPS would require that a qualified third-party monitor be present during appropriate operational phases to help protect subsurface resources. If buried archaeological resources cannot be avoided, impacts would be mitigated by recovery of data (excavation) and preservation of recovered materials and associated records. Any loss of undetected buried cultural resources would have an irreversible adverse impact. However, the impact on archeological resources as a whole would likely be minimal. Most of the known archeological sites can be protected from direct impacts from road construction and well drilling and production by avoidance. When significant sites cannot be avoided, impacts would be avoided or mitigated by excavating the site, using methodologies defined in a reviewed and approved research design. Again, protocols for the protection and/or treatment of National Register eligible archeological sites are set out in plans of operation and require consultation with the cognizant SHPO official in accordance with the 2008 NPS Programmatic Agreement. New drilling and production would result in adverse impacts on potential ethnographic resources. However, to identify ethnographic resources and associated community concerns and ensure that they are not adversely impacted by proposed oil and gas operations, consultation with tribes and other communities having a relation to specific ethnographic sites would be undertaken as project-specific plans of operations are developed.

Consultation with Indian tribes or other ethnographic communities would be undertaken as project-specific plans of operations are developed by the NPS, in an effort to identify ethnographic resources and associated community concerns and ensure that they are not adversely impacted by proposed drilling and production operations. As a result, operations that could occur in the park units would result in no impact or only slight adverse impacts on potential ethnographic resources.

Unplanned incidents associated with oil and gas operations such as well blowouts, fires, and major spills within the boundaries of a park present a risk of release of contaminants that can adversely impact cultural resources, especially historic structures and cultural landscapes if they are in the vicinity of the release or fire. If such an incident did occur to regulated operations, required mitigation measures such as use of blowout preventers and implementation of spill prevention and control plans would result in lessening the potential for spilled substances or a well fire to spread into the park, and for timely response and cleanup.

During geophysical exploration for regulated operations under alternative A, there would be localized, long-term, adverse impacts on historic structures associated with these sites. However, cultural resource surveys would be conducted beforehand as deemed necessary by resource specialists. With application of the protective measures in the plan of operation developed in accordance with the 2008 NPS PA, such as the application of offsets from historic structures, impacts would be minimized.

Plugging and reclamation could result in both short-term adverse impacts and long-term beneficial impacts on cultural landscapes and historic structures. For regulated operations under alternative A, compliance with NHPA and the 2008 NPS Programmatic Agreement including consultation with the cognizant SHPO would achieve avoidance, minimization, or mitigation of adverse effects. Application of these protocols would also prevent adverse impacts on known archeological resources. Consultation with tribes having a relation to the site would be undertaken as project-specific plans of operations are developed, in the effort to identify ethnographic resources and associated community concerns and ensure that they are not adversely impacted by proposed oil and gas operations.

Currently Exempt Operations

Under the no-action alternative, existing and future “access-exempt” operations and existing grandfathered operations would also result in impacts on cultural resources. These impacts are often more extensive or more severe compared to impacts that occur from regulated operations because exempt operations are not subject to NPS operating standards and protocols for section 106 consultation or dialogue with native communities that would serve to remove or reduce impacts.

The following discussion provides more site-specific detail of the current and potential impacts on cultural resources from activities associated with these currently exempt operations. Currently there are 78 access-exempt operations and 241 grandfathered operations in the category 1 park units. Impacts on cultural resources that would occur from ongoing exempt operations include those described above under “Typical Impacts of Oil and Gas Operations on Cultural Resources.” However, because these operations are not fully regulated, there is a higher level of risk of impacts from the proximity of wells to cultural resources, possible continuous but minor leaks of hazardous substances, and lack of erosion control or screening requirements that all cause more visual disturbances to the landscape. Similar to regulated operations, the primary effects on cultural resources from exempt oil and gas operations stem from the visual intrusion of an industrial use in a cultural landscape, historic district, or area of ethnographic concern which degrades the integrity of the resource. There are also inherent risks of the inadvertent destruction or degradation of the resource, particularly subsurface archeological resources. There are potential risks associated with the presence of contamination and equipment if the oil or gas operation sites are not secured. These impacts would last until reclamation is complete. Both grandfathered and access –exempt operations would present similar impacts, although the access –exempt operations may be better secured from visitors because they are on private property, which may be fenced or otherwise secured and not as accessible as the surrounding national park lands.

Exempt operations have the potential for continuing adverse impacts from the possible exposure to wastes and hazardous substances. As noted in appendix D, NPS inventory data has documented many instances of soil contamination and erosion on grandfathered sites that do not rise to the level of warranting suspension. Site-specific data reveal several instances of currently grandfathered operations that have been documented as having some form of contamination occurring on site, and the NPS has identified operating conditions at access-exempt sites that could potentially impact the cultural resources on federally owned lands. Poor operating practices at these sites sometimes leads to spills, leaks and other releases of oils, produced water, or other chemicals on site. Releases of oils or chemicals have contaminated soils in certain locations and have not been cleaned up because of lack of regulation and associated oversight. Under the no-action alternative, issues of contamination occurring at sites of exempt

operations are expected to continue or to be cleaned up at the discretion of the operator, resulting in a continued potential for long-term adverse impacts on cultural resources if the contamination is not remediated in a timely manner.

In addition to the potential for safety impacts, exempt operations also have impacts due to their locations near cultural resources, where they can be more easily seen and heard. Table 64 presents site-specific information regarding proximity of exempt operations to cultural use areas (based on GIS data and geospatial analysis of information obtained from the parks, which may not include all cultural resources present in the parks since mapping is not complete). There are currently 319 exempt operations in category 1 park units, 41 of which are within 500 feet of areas containing cultural resources as mapped by the parks. It should be noted that the boundaries of cultural resource areas may vary depending on how the data were entered into the park databases, so these distances are approximate and are used to give an idea of the proximity of wells to cultural resources at the parks. At Cuyahoga Valley National Park, the type of cultural resources that are within 500 feet of exempt wells vary from historic buildings and monuments, to trails surrounding these historic sites, and are not specified on the database. Areas that are archeological sites or possibly even historic resources would likely not be affected by these operations, but noise or visual intrusion could affect nearby cultural landscapes. For all other parks listed in table 64, the databases are not complete. In all cases, a site survey would be needed to assess potential impacts on cultural resources if this information is not contained in park inspection reports. Site inspections at Big South Fork indicate that 6 exempt well sites have sensitive cultural features present (see appendix D).

TABLE 64. EXEMPT-STATUS WELLS LOCATED WITHIN 500 FEET OF CULTURAL RESOURCE AREAS IDENTIFIED IN PARK DATABASES

Park Unit	Number of Exempt Operations	Number of Operations Located within 500 feet of Cultural Resource Areas
Aztec Ruins National Monument	1	0
Big South Fork National River and Recreation Area	152	0 (Note: Site inspection forms indicate 6 sites with sensitive cultural features.)
Big Thicket National Preserve	2	0
Cumberland Gap National Historical Park	2	0
Cuyahoga Valley National Park	87	41
Gauley River National Recreation Area	28	0
Lake Meredith National Recreation Area	41	0
New River Gorge National River	1	0
Obed Wild and Scenic River	5	0

Directional Drilling

Under the no-action alternative, the incentive for operators to locate their operations outside of park units would remain in place. Impacts on cultural resources from wells directionally drilled from outside the park to bottomholes beneath the park could occur, but would be limited, since locating the operations outside of park units would avoid direct impacts to park resources. Unknown subsurface archeological resources could be damaged by drilling through sites and cultural materials at drilling locations on adjacent lands outside the park, but it is unlikely that archeological sites in the park would be disturbed, due to the depth of the directional boreholes. Runoff or erosion could occur, impacting surface

archeological sites within the park units. Visual effects and noise and vibration could impact historic sites, ethnographic resources and cultural landscapes located on park lands adjacent to drilling operations. Under the 9B regulations, the NPS cannot impose preventative mitigation measures even if the operations may present an imminent danger to park resources or values by their proximity to park boundaries. Impacts could range from no impact on historic structures, cultural landscapes, and ethnographic resources to long-term adverse impacts on archeological sites, to potentially severe adverse effects in the case of a well blowout, fire or uncontrolled release that reaches cultural resources in the park. There would also be long-term beneficial impacts from the restoration of vegetation and natural site appearance.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limits, it is likely that many sites would have insufficient bonding for reclamation. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, remediation of well sites could be delayed indefinitely. Until well plugging and surface reclamation is completed, there would be potential adverse impacts on cultural resources at some well locations and in some parks because of the continued presence, inadvertent damage, and visual intrusion of these operations. Cultural resources destroyed or otherwise suffering a loss of integrity would not be directly replaceable, although funds might be used for indirect forms of compensation such as additional cultural resource surveys. Other wells that are not in culturally sensitive areas could have a delayed reclamation due to limits on bonding, and there would be slight impacts, if any at all, to cultural resources. Because performance bond amounts rarely approach \$200,000 for seismic operations, impacts on cultural resources from these operations are not generally tied to inadequate bond amounts. However, delayed reclamation for some operations could result in worsening adverse impacts on cultural resources as described above that could become long-term impacts.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations, impacts on cultural resources could result from oil and gas operations that could occur with no financial assurance to cover the cost of remediation if there is no performance bond in place. If the new owner defaults before posting financial assurance, the NPS would need to seek and acquire funding for reclamation. Reclamation could be delayed indefinitely. Over the interim period, the absence of reclamation could present a barrier, albeit minimal, to the use of cultural sites, and potential adverse impacts on cultural resources would continue.

Enforcement and Penalties

Under the no-action alternative, the absence of penalties for minor acts of noncompliance would result in the continued lack of incentive for operators to fully comply with NPS operating standards. This increases the risk of unnecessary impacts on cultural resources from indirect effects of spills and site erosion.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages and any associated loss of cultural resources that result from privileged use of federal surface estate.

Cost Recovery

Under the no-action alternative, lack of cost recovery could have an indirect adverse impact on cultural resources, because additional money collected to support the NPS permitting, monitoring, and compliance programs could be used to improve or protect park resources or provide more pleasing, safe, and natural

and cultural resource conditions that are accessible for visitors to view, use for recreation and interpretation, and experience. Therefore, the non-recovery of costs under the no-action alternative would result in adverse impacts on cultural resources.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect cultural resources in the parks. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on cultural resources in the area of analysis and a brief summary of the cumulative impacts of these actions on cultural resources are listed in tables 65 and 66.

TABLE 65. CUMULATIVE IMPACTS ON CULTURAL RESOURCES (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Cultural Resources
Abandoned mine lands reclamation	Long-term beneficial effects of addition of safety features and signage following reestablishment of vegetation cover and natural contours and closure of mine shafts.
Future oil and gas development on adjacent lands	Indirect adverse impacts on park cultural resources if the operations are close enough to result in “spill-over effects” such as sedimentation and contamination from surface runoff or noise and visual impacts that are audible or visible from cultural landscapes or ethnographic resources located within the park.
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term adverse effects on cultural resources from noise, visual disturbance and access restrictions that can occur on roads during reclamation. Long-term beneficial effects of restoration of sites, removal of sources of contamination and contaminated soils that are a visual eyesore. However, the frequent inability to restore or replace cultural resources that have lost integrity may render the effect negligible.
Recovery actions against operators that damage park resources under 54 USC 100721	Long-term beneficial effects of cleanup of areas and recovery of natural resources that have been damaged from oil and gas spills that affected park lands and resources; removal of visual eyesores. However, the frequent inability to restore or replace cultural resources that have lost integrity may render the effect negligible.
Other/private development not subject to federal cultural resource laws	Indirect adverse impacts on park cultural resources if development is close enough to result in “spill-over effects” such as sedimentation and contamination from surface runoff or noise and visual impacts that are audible or visible from cultural landscapes or ethnographic resources located within the park. Direct adverse effects on cultural resources located on private lands if no protection, including destruction of archeological and/or historic resources.

TABLE 66. CUMULATIVE IMPACTS TO CULTURAL RESOURCES – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Big South Fork National River and Recreation Area	Actions include facility and road construction; existing and future coal mining operations; logging and agricultural activities; prescribed fires; commercial and residential development, plugging and reclamation of abandoned wells including 39 under ARRA funded program, and park resource surveys and management.	Any action that involved ground disturbance could involve destruction of cultural resources such as archeological artifacts and historic structures, especially if there is or was no federal permitting involved. Mining operations may have affected cultural resources, as could agricultural use and logging operations. Other construction related actions could have adverse effects. Fires can destroy cultural resources, but prescribed fire reduces extreme fire potential that can severely harm resources. Beneficial impacts from abandoned well plugging – removal of hazardous and leaking equipment that can directly affect cultural artifacts and can degrade cultural landscapes. Beneficial impacts from park survey and preservation efforts.
Obed Wild and Scenic River	Catastrophic release; residential or commercial development in the watershed.	Contamination from spill – no direct effects on cultural resources known; possible indirect effects from oil seepage; any action that involved ground disturbance could involve destruction of cultural resources such as archeological artifacts and historic structures, especially if there is or was no federal permitting involved.
Big Thicket National Preserve	Actions include facility and road construction; existing and future logging and agricultural activities; prescribed fires; residential, commercial and industrial development in surrounding areas; forestry; plugging of abandoned wells and park resource surveys and management.	Any action that involved ground disturbance could involve destruction of cultural resources such as archeological artifacts and historic structures, especially if there is or was no federal permitting involved. Forestry and logging operations may have affected cultural resources, as could other construction related actions. Fires can destroy cultural resources, but prescribed fire reduces extreme fire potential that can severely harm resources. Beneficial impacts from abandoned well plugging – removal of hazardous and leaking equipment that can directly affect cultural artifacts and can degrade cultural landscapes. Beneficial impacts from park survey and preservation efforts.
Lake Meredith National Recreation Area	Actions include road and trail construction and maintenance; water impoundments (i.e., Lake Meredith); recreational off-road vehicle use, prescribed fires; ranching and farming; residential, commercial and industrial development in surrounding areas; plugging of abandoned wells; and park resource surveys and management.	Any action that involved ground disturbance could involve destruction of cultural resources such as archeological artifacts and historic structures, especially if there is or was no federal permitting involved. Other construction related actions could have adverse effects. Ranching and farming operations may have affected cultural resources, as could other development related actions. Fires can destroy cultural resources, but prescribed fire reduces extreme fire potential that can severely harm resources. Beneficial impacts from abandoned well plugging – removal of hazardous and leaking equipment that can directly affect cultural artifacts and can degrade cultural landscapes. Beneficial impacts from park survey and preservation efforts.
Aztec Ruins National Monument	Road building and trail construction; park resource surveys and management.	Construction related actions have short-term adverse effects on archeological resources, but there are long term benefits from park survey and preservation efforts.

Park Unit	Cumulative Actions	Description of Impacts
Cuyahoga Valley National Park	Actions include facility and road and trail construction; existing and future agricultural, transportation, residential and commercial development activities around the park; prescribed fires; plugging and reclamation of abandoned wells, and park resource surveys; Countryside Initiative.	Any action that involved ground disturbance could involve destruction of cultural resources such as archeological artifacts and historic structures, especially if there is or was no federal permitting involved. Agricultural use, land development, and transportation projects may have affected cultural resources. Fires can destroy cultural resources, but prescribed fire reduces extreme fire potential that can severely harm resources. Beneficial impacts from abandoned well plugging – removal of hazardous and leaking equipment that can directly affect cultural artifacts and can degrade cultural landscapes. Beneficial impacts from park survey and preservation efforts and Countryside Initiative that preserves farmland and cultural landscapes.
Gauley River National Recreation Area	Mined land reclamation; ongoing park operations and maintenance; road and trail construction; plugging and reclamation of abandoned wells, and park resource surveys.	Any action that involved ground disturbance could involve destruction of cultural resources such as archeological artifacts and historic structures, especially if there is or was no federal permitting involved. Mining operations may have affected cultural resources. Other construction related actions could have adverse effects. Beneficial impacts from abandoned well plugging – removal of hazardous and leaking equipment that can directly affect cultural artifacts and can degrade cultural landscapes. Beneficial impacts from park survey and preservation efforts.
New River Gorge National River	Same as above.	Same as above.
Cumberland Gap National Historic Park	Same as above plus acquisition of Fern Lake and surrounding area.	Same as above plus benefits from acquisition and protection of additional areas in the park.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Overall, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units. Implementation of the current 9B regulations on regulated operations would have a mostly beneficial impact on cultural resources in all category 1 and 2 park units, while exempt operations would cause adverse impacts stemming primarily from the current lack of regulation and oversight. Under the no-action alternative, these impacts would continue to be adverse into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the context of oil and gas development or other private development occurring in the broader study area, the number of exempt wells involved, the distance of those wells to most areas of intensive cultural resource presence, and the other cumulative actions affecting the resource in the entire study area. The programmatic level cumulative actions listed above also apply to these parks.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations except for the requirement that cultural resource surveys, such as ‘reconnaissance surveys,’ not just their results, be filed with the

operations permit application. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in measurable impacts. Impacts on cultural resources from permitted operations would be as described for alternative A, no action.

Previously Exempt Operations

Compared to the existing condition, bringing previously exempt oil and gas operations under the 9B regulations would not substantially change the impacts on cultural resources of wells that are located relatively close to areas of intensive concentration of cultural resources. Wells would not be relocated unless impacts were extremely severe and could not be mitigated, and it is not expected that that would occur for any of the previously exempt wells. If conditions were that severely adverse for grandfathered operations, steps would have been taken earlier under the “imminent threat” provision to move the operations or apply mitigation, and that did not occur. There would still be the presence of an industrial operation at the well locations, with impacts on scenic views that will affect some historic sites, depending on the visitor’s sensitivity to the presence of the wells. Impacts from workovers and production would also continue, as would the potential for releases of hazardous substances and exposure to oils and chemicals. However, the change in regulation would reduce indirect impacts and the risks of impacts on cultural resources from oil and gas operations because of the impact of implementing better operating practices that, for example, would reduce impacts of contamination on archeological resources or the visual impacts of a contaminated site in a cultural landscape area, resulting in long-term beneficial impacts. Once the rule change is implemented, these operations would need to meet the least damaging standard that incorporates mitigation measures and the operating standards that are specified in the regulations. The operating standards that would now apply to previously exempt operations include the requirement for an emergency response plan, removal of pits to minimize the possibility of site contamination, providing signage for information and safety, providing fencing around wells and equipment to secure the site, removal of wastes and scrap, and shutting in of wells if drilling and production is suspended for less than 30 days. These actions would result in reduced exposure to hazardous chemicals and equipment and contaminated debris. Mitigation that could be required as part of the permitting of exempt operations includes managing traffic and hiring security personnel as needed, adding lighting for safety but keeping lighting to a minimum and using directional lighting and low pressure lights, painting the operations to blend in better with the landscape, using muffling devices and directing noise away from culturally sensitive areas if possible. However, a few of these measures such as security fencing and lighting have the potential to make wells more visually intrusive if they were previously not lighted or not very noticeable, and changing topography and revegetation might not be in keeping with a particular cultural landscape. However, such unintended consequences are unlikely and would be avoided by extending the provisions the operations permit which incorporate section 106 compliance to these areas of operations.

The proposed rules also require that operators must begin reclamation as soon as possible and no later than 6 months after the well is no longer in use. The sites would need to be graded to elevations that maximize ecological value and be appropriately revegetated. For those operations on private lands (previously access-exempt) where there is a reasonable chance of accidents affecting cultural resources on federal lands, bringing these operations within the scope of the 9B regulations will allow park managers to take a proactive approach to protecting the federal interest by ensuring that operations inside the park unit are conducted in a manner that offers the highest possible protection to a park’s resources and values. The risk of impacts from spills that could reach park property and affect cultural resources by limiting access or creating a damaged landscape or historic structure would be substantially reduced by implementation of strong spill prevention, control, and countermeasure technologies.

As previously discussed, oil and gas management plans have been developed for several category 1 park units (i.e., Big South Fork National River and Recreation Area, Obed Wild and Scenic River, Big Thicket National Preserve, Lake Meredith National Recreation Area, and Padre Island National Seashore). These plans establish recommended setbacks for oil and gas operations from SMAs that include sensitive cultural landscapes and historic sites. The permitting of future plans of operations within these park units would be subject to these SMA setback recommendations, which would be reviewed and adapted for each proposed operation under the discretion of the park superintendent, in order to provide for the protection of sensitive resources.

Looking at site-specific information available for the nine parks with previously exempt operations, under alternative B, 78 currently access-exempt operations would also be subject to 9B regulations because they are located within the boundary of a park unit, and any future oil and gas development on private property located within the park boundary would be subject to regulation. Also, all 241 currently grandfathered operations would be brought under 9B regulatory authority. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. As a result, beneficial effects would occur to cultural resources through requirements to adhere to these standards and measures, and these are described above. Information submitted by the operator would also be valuable to the NPS to monitor approved operations in the future to ensure continued compliance with NPS operating standards, thereby protecting historic sites that may be around the wells.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B, impacts on cultural resources would be the same as described under alternative A.

Financial Assurance

Adverse impacts affecting cultural resources, such as damage to the integrity of historic resources or visual intrusion into the park setting would be remediated, to the extent they could be remediated, in a more timely manner with the enhanced financial assurance requirements under alternative B. Impacts on cultural resources from seismic operations are not generally tied to inadequate bond amounts, so this provision would not have much of an impact on this specific phase of oil and gas development. However, adequate bonding for drilling and production phases would enable the NPS to reclaim sites sooner in the event of an operator default. This would result in a beneficial change to impacts on cultural resources compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. This would reduce the minimal risk that the NPS would suffer unnecessary loss of use and potential adverse impacts on cultural resources that could occur from the lingering presence of a visual intrusion or hazards from contaminated sites.

Enforcement and Penalties

Under alternative B, the new penalty provision that would be established would provide incentives for an operator to comply with the 9B regulations and, in turn, facilitate protection of park resources and values, including cultural resources, resulting in a long-term indirect beneficial impact compared to the existing condition.

Compensation for Access across Federally Owned Land

Under alternative B, beneficial impacts on cultural resources may result from compensatory reclamation activities that may be done in lieu of an access fee. These activities could include restoration of disturbed areas, including legacy oil and gas sites, to natural conditions. Over the long term, beneficial impacts on cultural resources would accrue from such reclamation measures completed under alternative B, compared to the existing condition.

Cost Recovery

Under alternative B increased monitoring and evaluation of operations would allow for NPS to detect potential problems such as spills and releases, and ensure operational compliance, thereby mitigating potential impacts on many resources which are important sources of visitor enjoyment and use at the parks, including cultural resources. Although permit application fees could be used for a variety of programs, benefits from cost recovery could accrue to cultural resources to the extent these funds were applied to increased monitoring and evaluation for those operations with impacts to cultural sites. As a result, under alternative B, cost recovery could have a beneficial impact on cultural resources compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, both adverse and beneficial cumulative impacts would occur from projects, plans and actions and trends in oil and gas development that were considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued operations of permitted and newly regulated operations, which would continue to have long-term direct adverse impacts on cultural resources, as described in the above analysis. Bringing previously exempt operations under regulation would add substantial beneficial impacts on resources that form the basis for many types of visitor use and enjoyment. When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts on overall cumulative impacts from the change in regulations.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on cultural resources from implementation of alternative C would be the same as those described for alternative B, with long-term benefits compared to the existing condition.

By the same reasoning as above, impacts at the site-specific level for the nine parks with previously exempt operations would be the same as described for alternative B. Therefore, alternative C would result in long-term, direct beneficial impacts on cultural resources at the site-specific level of analysis.

Directional Drilling

The regulation of directionally drilled wells under alternative C would result in both direct and indirect beneficial effects to cultural resources beyond park boundaries either by application of NPS operating standards and protocols for section 106 compliance on operations already located outside the unit, or by operators choosing a surface location inside the park boundary.

The application of regulations on surface and subsurface operations located outside of NPS boundaries may potentially remove a key incentive for operators to locate operations outside of park units. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed (O'Dell pers. comm. 2013d) (see the "Socioeconomics" section). As a result of the changes in alternative C, operators may be more likely to select locations within park unit boundaries, thereby intensifying direct impacts on park resources, including cultural resources. If surface locations are sited within the park unit boundaries, adverse effects on park cultural resources would include those impacts previously described under "Typical Impacts of Oil and Gas Operations on Cultural Resources" and include loss of access in certain areas, presence of an industrial use within a park and intrusion into natural settings, noise from drilling and production (including periodic workovers), and possible risks of the destruction of cultural resources or the degradation of their integrity related to exploration and production activities that would be associated with wells. However, under NPS regulation of directionally drilled wells, cultural resources would be avoided, or mitigation would be required, to reduce or eliminate adverse impacts. This could reduce adverse impacts on those resources that would not have been afforded protection on private property outside park boundaries without NPS regulation and would be a beneficial impact on cultural resources. However, although a strong policy preference exists which compels the NPS to locate operations outside of identified sensitive areas, alternative C could create additional long-term direct adverse impacts to cultural resources within park units compared to the existing condition.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. This, in turn, would facilitate protection of park resources, including cultural resources, resulting in a long-term indirect beneficial impact on cultural resources.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, there would also be effects that would occur as a result of oil and gas operations that would continue to affect cultural resources where impacts cannot be avoided, and benefits from bringing previously exempt operations under regulations and the resultant reduction in adverse impacts, as described in the alternative B analysis. Alternative C would contribute to cumulative impacts mostly by adding beneficial impacts of bringing previously exempt operations under regulation, but also by possibly adding adverse impacts from the change in directional drilling regulations that could result in more oil and gas development within park units as opposed to outside park boundaries. Overall under alternative C, both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on cultural resources from the existing condition. Continuing impacts on cultural resources from both regulated and exempt operations would be expected. Impacts would be as described in the analysis, with an increased risk of more severe or extensive adverse impacts on or near access-exempt or grandfathered sites unless those sites changed to a regulated status by moving into a plugging/reclamation phase or a change of ownership, which may not occur at all or occur very slowly. Adverse effects from these exempt operations would include possible risks of the destruction of cultural resources or the degradation of their integrity and visual impacts of sites that may be exacerbated by site erosion and lack of adequate distance between sites and areas of intensive cultural resource presence. As a result, there would be continuing impacts from ongoing oil and gas activities occurring within the park units. Plugging and reclamation of wells would result in long-term beneficial impacts, and occasional seismic surveys would have minimal effects on cultural resources. Directionally drilled wells would continue to be a potential source of indirect adverse effects if they are sited close to the parks and contaminated soils or water leaves the site or if they can be seen, thereby disrupting cultural landscapes. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have minimal indirect effects on cultural resources, due to delays in reclamation or possible lack of funding or enforcement that can increase risk of having sites that are not maintained free of debris or wastes or properly reclaimed in a timely manner. Because the adverse effects under alternative A would be generally localized and would not result in degradation or loss of park cultural resources because consultation requirements and park oversight would be required, these impacts would not be significant.

When combined with beneficial and adverse impacts from continuing actions taken under the existing 9B oil and gas regulations, cumulative impacts would be long term and both adverse and beneficial, and the continuation of the current 9B regulations would represent only a slight contribution to overall cumulative impacts on cultural resources in the study area. Beneficial effects would result from continued regulation and implementation of mitigation for most of the wells within NPS boundaries, while adverse effects would accrue from the continued unregulated operation of exempt wells. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, regulatory revisions would result primarily in long-term indirect beneficial impacts on cultural resources, compared to the existing condition. Benefits would accrue primarily from reduced risk to cultural resources due to previously exempt operations being subject to “least damaging” and other operating standards and protocols for section 106 NHPA consultation as opposed to no standards (access-exempt operations), or a standard of “immediate threat of significant injury” (grandfathered operations), as was the case under the no-action alternative. This would result in improved site appearance from erosion/sedimentation control, cleanup of spills, wastes and debris, reduced fire hazards, and improved spill prevention and countermeasure actions compared to the existing condition. Other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit resources at the parks, which indirectly benefit the visitors using and viewing those resources. Overall these regulatory improvements would result in long-term indirect beneficial impacts on cultural resources compared to the existing condition. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would be very

limited in extent compared to the entire park area, and mitigation measures or other protection would be required by consultation and would reduce the loss or degradation of cultural resources, the impacts of this alternative would not be significant.

When combined with the effects of all other actions in the study area, cumulative impacts from the actions under alternative B would be long term and both adverse and beneficial, with alternative B contributing mainly beneficial impacts to overall cumulative impacts from the change in regulations. Adverse impacts of oil and gas development would be localized, limited and subject to regulatory review including section 106 consultation, and would not be significant.

Alternative C

Under alternative C, impacts of the regulatory changes would also be primarily beneficial, although the change in regulation of directionally drilled wells could move some potential risks to cultural resources into parks that might otherwise be avoided. The same extension of regulatory authority and oversight to currently exempt operations would occur as described for alternative B, but with the possibility of some wells (operations located wholly on non-federally owned lands but still within the boundary of a park unit) not being under the regulations if they meet certain criteria. However, these criteria are very strict and require protection to avoid adverse impacts on park lands. NPS regulatory authority would be extended to include directionally drilled wells. That change in regulations could result in long-term beneficial impacts since better standards would be applied both inside and outside the park. However, regulating directional drilling could potentially result in a greater concentration of adverse impacts such as risks of the destruction of cultural resources or the degradation of their integrity and visual impacts of sites from site erosion within park boundaries following the removal of regulatory incentives to locate operations outside of park units. Therefore, alternative C could create additional long-term, direct adverse impacts to cultural resources within park units compared to the existing condition, although these impacts would be localized and small in number.

Similar to alternative B, other regulatory changes would result in an improved process of handling minor acts of noncompliance, accelerated reclamation of sites compared to the existing condition, and funding sources that could indirectly benefit cultural resources at the parks. The regulatory improvements in alternative C would result mainly in long-term indirect beneficial impacts on cultural resources, primarily from bringing previously exempt operations under regulation. Because alternative C would result in primarily beneficial effects, and any adverse effects of regulated operations would be limited in extent compared to the entire park area, and mitigation measures or other protection would be required by consultation and would reduce the loss or degradation of cultural resources, the impacts of this alternative would not be significant.

Both adverse and beneficial cumulative impacts would accrue from projects, plans and actions considered in the cumulative scenario. When combined with the effects of all other actions in the study area, cumulative impacts would be long term and both adverse and beneficial. Adverse impacts of oil and gas development would be localized, limited and subject to regulatory review including section 106 consultation, and would not be significant.

PARK MANAGEMENT AND OPERATIONS

METHODOLOGY

Potential impacts on park management and operations are assessed based on the actions being proposed and by determining whether the administrative ability of park units would be adequate to manage the required permitting activities for surface uses that would be permitted for oil and gas development within

the park units, as well as other natural-resource-related activities mandated by law, regulation, agreement or litigation. Because oil and gas development is driven to a large degree by individual operator's financial considerations within the context of the global petroleum economy, and because specific locations of hydrocarbon accumulations in all of the category 1 and 2 park units are unknown, the NPS cannot speculate where individual operators would conduct their operations. It is therefore only possible to qualitatively assess impacts on park management and operations assuming that oil and gas development for which NPS administrative oversight is required would continue into the foreseeable future. As previously discussed, several oil and gas plays are associated with the park units of interest in this EIS (see figure 7). In cases where oil and gas reserves exist, this analysis assumes that all potentially productive areas would remain open for oil and gas activities.

IMPACTS OF ALTERNATIVE A: NO ACTION

The main aspects of park management and operations that may be affected by actions under the alternatives include staffing and use of other park administrative resources and material support. Park staff workloads and priorities may need to be rearranged to implement oil and gas management actions, and funding for management actions may exceed the current oil and gas management budget and would require additional personnel over and above what would normally be expected to be funded.

Typical Impacts of Oil and Gas Operations on Park Management and Operations

NPS management incurs costs related to implementation of the 9B regulations by engaging park service personnel in activities such as the following:

- Processing permit applications;
- Monitoring operations to ensure that operators are in compliance with all applicable laws, regulations, and NPS permits;
- Addressing incidents of noncompliance;
- Maintaining records, providing information to the public and congress, and addressing legal issues; and
- Preparing guidance and policy documents and participating in training or workshops related to oil and gas management.

As shown in table 67, the NPS has estimated the overall annual cost related to the administration of oil and gas management responsibilities to be approximately \$1.4 million. This baseline cost to the NPS of conducting its 9B regulatory program was assessed by compiling the salaries, benefits, and expenses of park personnel and central office personnel engaged in the above activities and allocating time to each of the above categories on a park-by-park and office-by-office basis. Parks with a consistent flow of new permit applications, such as Big Thicket National Preserve, spend more time permitting than parks such as Big South Fork National River and Recreation Area, where the primary effort is monitoring and working with grandfathered operators.

TABLE 67. ANNUAL COST OF NPS ADMINISTRATION OF OIL AND GAS MANAGEMENT PROGRAM

Program Sector	Annual Cost
Permitting	\$490,000
Monitoring	\$270,000
Compliance	\$300,000
Administration and Legal Issues	\$160,000
Planning and Guidance	\$160,000
Total Cost	\$ 1,380,000

Impacts from Geophysical Exploration

During the geophysical exploration phase, adverse impacts on park management and operations could result from increased workloads and demands for NPS employees administering to the permitting and compliance under current 9B regulations for nonexempt oil and gas operations and conducting site inspections to monitor adherence to mitigation measures outlined in approved plans of operations. These demands may result in adverse impacts on park management and operations in cases where there are insufficient personnel available to staff these responsibilities at individual park units.

Impacts of Well Drilling and Production

During the operational phase of oil and gas facilities, park staff and resources would be required to evaluate drilling and production on a case-by-case basis to determine the effect on park resources, and problems, leaks and violations would be handled through base workload inspections and monitoring. These requirements extending over the operational lifetime of oil and gas facilities can result in continued adverse impacts on park management and operations, depending on the number of operations and level of activity occurring within the park at any one time. In addition, the enforcement of timing stipulations for drilling and production operations in special management areas of the park units would require dedicated time and resources of NPS staff. Similarly, the increased truck traffic associated with drilling and production operations, especially those involving hydraulic fracturing, would require additional NPS staff and resources to ensure effective management of roadway conditions and minimize impacts on visitor traffic. Unplanned accidents associated with oil and gas operations such as well blowouts, fires, and major spills within the boundaries of park units could pose a severe impact on park management and operations. Depending on the degree of response and the amount of resources needed, these incidences could require additional staffing and the use of other park administrative and material resources.

Impacts of Plugging and Reclamation

The plugging and reclamation of wells impacts park management and operations because such activities involve processing plans of operation on a case-by-case basis and overseeing the outcome of reclamation. Such actions can increase the workload of NPS staff. NPS staff is required to review and approve plans and applications for exemptions and to subsequently monitor well abandonment and site reclamation to ensure that park resources are returned to approximate predisturbance conditions and that natural conditions and processes are restored. The administration of these requirements results in short-term adverse impacts on park management and operations. Once wells are plugged and reclaimed, there are typically long-term beneficial impacts due to prevention of further pollution and degradation associated with the unplugged wells that would require additional time and expense at the park level.

Regulated Operations (Current and Future)

Impacts on park management and operations that would occur from ongoing or future permitted oil and gas production operations include those described above under “Typical Impacts of Oil and Gas Operations on Park Management and Operations.” The current requirements in terms of staffing and administrative resources that are needed to fulfill the mandate of the current 9B regulations would continue to occur under alternative A. These include costs to the park to deal with processing plans of operations and completing required compliance (e.g., NEPA documentation for approval of plans of operation), enforce operational standards and to administer to the control of “wild” wells, proper handling of wastes, and conduct of operations in a “safe and workmanlike manner (see current 36 CFR 9.41). Impacts would likely be greater to park operations for those units with a high number of current and/or exempt operations and for those units that exhibit a greater potential for future operations due, for instance, to their proximity to Marcellus shale.

Once the currently regulated operations move into the plugging and reclamation stage of operation, they are required to adhere to additional 9B requirements that ensure that well sites are plugged and reclaimed properly. Meeting the NPS requirements of leaving the site in a clean and safe condition in preparation for surface reclamation often involves placing liners underneath plugging equipment, using steel tanks instead of earthen pits, removing ground structures, equipment, and debris, restoring the natural contour of the land, and reestablishing native vegetative communities. NPS also requires cementing and casing requirements for plugging, and testing of plugs to verify they have been set at the correct depth and provide the intended wellbore isolation. The costs to the NPS in terms of staff and resources of ensuring operational compliance with these requirements would continue under alternative A, and would result in long-term adverse impacts on park management and operations.

Currently Exempt Operations

Under the no-action alternative, exempt operations are not subject to NPS operating standards and mitigation measures. Oil and gas operations that are currently exempt from the 9B regulations would remain exempt and would not fall under the responsibility of park staff as long as they did not represent a significant threat of damage to park resources.

Access-exempt operations are outside the scope of the current 9B regulations and are not required to meet NPS operational standards for least damaging methods. However, these operations do have the potential to adversely affect park management and operations in the event that catastrophic failures such as spills or leaks impact park property. In such cases, these operations would pose a significant threat of damage to park resources and would require a response from NPS staff and dedicated administrative resources. Because these operations are not regulated, there is a higher level of risk of impacts from continuous but minor leaks, lack of erosion control measures, use of earthen pits, or location close to sensitive resources. It is generally unlikely, however, that such operations would reach the point at which they are considered to be a significant threat of damage to park resources. Consequently, under the no-action alternative, existing and future “access-exempt” operations would usually result in minimal impacts on park management and operations.

Grandfathered operations have the potential to adversely affect federally owned or administered lands or waters. Grandfathered operations may continue without an approved NPS plan of operations, but may be suspended if they pose an “imminent threat of significant injury” to park resources. In such cases, these operations would require a response from NPS staff and dedicated administrative resources.

Site-specific data reveal several instances of currently grandfathered operations that have been documented as having some form of contamination occurring on site, and the NPS has identified

operating conditions at well sites that could potentially impact resources on federally owned lands, requiring the need for administrative action. For example, leaks at wellheads, tank batteries, and pump jacks have been documented at Big South Fork National River and Recreation Area and Cuyahoga Valley National Park. Appendix D presents information regarding the instances of known site contamination for each park unit with exempt operations.

Because these exempt operations are not fully regulated, there is a higher level of risk of impacts from continuous but minor leaks, lack of erosion control measures, use of earthen pits, or locations close to sensitive resources. These risks represent an ongoing potential need for prompt administrative action in the event of an emergency which may result in temporary adverse impacts on park management and operations. However, it is generally unlikely that such operations would reach the point at which they are considered to be a significant threat of damage to park resources. Consequently, under the no-action alternative, existing and future exempt operations would result in a minimal effect on park management and operations.

Directional Drilling

Under the no-action alternative, the incentive for operators to locate their operations outside of park units would remain in place. The location of surface operations outside of park units avoids direct impacts to resources and values within the park unit and a reduced potential for associated NPS administrative action. Under no-action, the NPS cannot require preventative mitigation measures even if the operations present an imminent danger to park resources or values by their proximity to park boundaries. These operations would have the potential to adversely affect park management and operations in the event that catastrophic failures such as spills or leaks impact park property. In such cases, these operations would pose a significant threat of damage to park resources and would require a response from NPS staff and dedicated administrative resources. However, it is generally unlikely that such operations would reach the point at which they are considered to be a significant threat of damage to park resources. Consequently, under the no-action alternative, directionally drilled operations would result in minimal impacts on park management and operations unless a catastrophic release reached or affected park property.

Financial Assurance

Under the no-action alternative, with the existing financial assurance limits, it is likely that many sites would have insufficient bonding for reclamation. NPS data indicates that the current bonding requirements are not sufficient to cover the full cost of reclamation for a majority of the currently regulated operations. In the event of operator default on its reclamation responsibilities, the NPS would need to seek and acquire additional funding if necessary for reclamation. As a result, dedicated funding would be required along with additional full-time equivalent (FTE) staff and resources to perform the activities related to reclamation. The potential for additional administrative and financial burden and expanded responsibilities placed upon NPS park resource specialists would result in adverse effects to park operation and management.

Financial Liability of Operators / Transfer of Interest

Under the existing 9B regulations, impacts on park management and operations could result if the new operator defaults on his obligation before a new performance bond is in place. In such cases, the responsibility of well maintenance would fall upon NPS personnel as it currently does for abandoned operations. The NPS would then need to seek and acquire funding for cleanup and/or reclamation. In addition to dedicated funding, additional FTE staff and resources to perform the activities related to reclamation would be required. Under the no-action alternative, the potential for this additional

administrative burden and expanded responsibilities placed upon NPS park resource specialists, albeit minimal, could result in adverse effects to park management and operations.

Enforcement and Penalties

Under the no-action alternative, the continuation of the existing absence of any penalty provision for minor acts of noncompliance would not result in any discernible impacts on park management and operations. However, over the long term, such minor acts of noncompliance have the potential to culminate in major issues such as spills and leaks, requiring large NPS resource expenditures and high demands for staff, resulting in long term adverse effects to park management and operations.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the federal government would not be compensated for damages and any associated loss of resources that result from privileged use of federal surface estate. The responsibility of road maintenance would fall upon the NPS, which must seek and acquire additional funding to perform the work required to protect park resources. In addition to dedicated funding, additional FTE staff and resources to perform the activities would also be required. Under the no-action alternative, the potential for this additional administrative burden would result in adverse effects to park operation and management.

Cost Recovery

Under the no-action alternative, lack of cost recovery and additional money that could be collected to support NPS permitting, monitoring, and compliance programs would continue, resulting in administrative burdens upon NPS park resource specialists. Consequently, adverse effects would accrue to park operation and management under the alternative A.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect park management and operations at the parks. Management planning, such as fire management, vegetation management, ORV plans, and oil and gas management plans, can result in beneficial impacts on park management and operations by providing guidance for improved management strategies and proper allocation of NPS resources. However, preparation and administration of these plans creates a sizable demand on staff time. Actions that cause additional burdens on park administrative resources (such as prescribed burns, facility construction and mine reclamation) can result in adverse effects on park resources and management by placing additional demands on NPS staff and material resources. Past, present, and reasonably foreseeable activities that would have beneficial or adverse impacts on park management and operations in the area of analysis (including both park lands and adjacent lands) and a brief summary of the cumulative impacts of these actions on park management and operations are listed in table 68.

TABLE 68. CUMULATIVE IMPACTS ON PARK MANAGEMENT AND OPERATIONS (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Park Management and Operations
Prescribed fires and fire management actions	Possible short-term adverse effects to park management and operations from increased administrative and financial burden during the period of management action. Long-term beneficial impacts on park management and operations by providing guidance for improved management strategies and proper allocation of NPS resources.
NPS facility and road construction	Possible short-term adverse effects to park management and operations from increased administrative and financial burden during the period of construction. Long-term beneficial impacts on park management and operations following improvements to infrastructure that provides for more efficient operations within park units.
Abandoned mine lands reclamation	Possible short-term adverse effects to park management and operations from increased administrative and financial burden during the period of reclamation. Long-term beneficial effects of improvements to park resources, resulting in a decrease of administrative and financial burden that would have been associated with deferred reclamation.
Vegetation management	Long-term beneficial impacts on park management and operations by providing guidance for improved management strategies and proper allocation of NPS resources.
Oil and Gas Management	Long-term beneficial impacts on park management and operations by providing guidance for improved management strategies and proper allocation of NPS resources.
ORV use management	Long-term beneficial impacts on park management and operations by providing guidance for improved management strategies and proper allocation of NPS resources.
Future oil and gas development on adjacent lands	Short and long-term indirect adverse impacts on park management and operations from the potential for damage to park resources from nearby sites and the need for administrative action, leading to an increase in administrative and financial burden to parks.
Recovery actions against operators that damage park resources under 54 USC 100721	Short-term adverse impacts on park management and operations from increased administrative burden during recovery action. Long-term beneficial impacts on park management and operations as a result of the cleanup of affected areas and the recovery of damaged natural resources, leading to a decrease of administrative and financial burden that would have been associated with deferred action.

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 69 includes an accounting of cumulative impacts that could affect park management and operations in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 69. CUMULATIVE IMPACTS ON PARK MANAGEMENT AND OPERATIONS – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Grazing; agricultural activities; road building.	Road building activities would have long-term indirect beneficial effects on park operations resulting in decreased administrative burden over time. The potential for resource impacts associated with other activities such as agricultural and grazing activities could also indirectly adversely affect park operations by increasing costs associated with administrative and management actions aimed at resource protection.
Big South Fork National River and Recreation Area	Actions include prescribed fires; plugging and reclamation of abandoned wells including 39 under ARRA funded program.	The construction activities, prescribed fires, and plugging and reclamation activities would have long-term beneficial effects on park operations resulting in decreased administrative burden over time. The potential for resource impacts associated with other activities such as agricultural and forestry operations, coal mining and commercial development, could also indirectly adversely affect park operations by increasing costs associated with administrative and management actions aimed at resource protection.
Big Thicket National Preserve	Actions include agricultural and forestry (logging) operations; road construction; plugging of abandoned wells under ARRA funded program.	Road construction activities and plugging and reclamation would have long-term beneficial effects on park operations resulting in decreased administrative burden over time. The potential for resource impacts associated with other activities such as agricultural and forestry operations could also indirectly adversely affect park operations by increasing costs associated with administrative and management actions aimed at resource protection.
Cumberland Gap National Historic Park	Park developments and establishment of nearby State Parks; acquisition of Fern Lake and surrounding area.	Improvements following park developments and establishment of nearby State Parks would have long-term indirect beneficial effects on park management and operations resulting from additional resource management and protection on adjacent state lands. Acquisition of additional lands contributes to long-term adverse effects on park operations as the result of the increased administrative and management burden.
Cuyahoga Valley National Park	Land development and construction outside the park; ongoing park operations and maintenance; agricultural use.	Ongoing park operations and maintenance activities contribute cumulatively to the administrative burden of management at the park unit. The potential for resource impacts associated with agricultural uses could also adversely affect park operations by increasing costs associated with administrative and management actions aimed at resource protection.
Gauley River National Recreation Area	Urban development. Transportation infrastructure improvements; mined land reclamation and acid mine drainage.	Improvements to park operations following transportation and infrastructure projects would have long-term indirect beneficial effects resulting from decreased administrative burden over time. Mine-land reclamation and acid-mine drainage issues contribute to increased administrative burden on park management and operations and increased costs associated with on-going resource protection.
Lake Meredith National Recreation Area	Actions include recreational ORV use and other visitor use.	ORV use management would provide guidance for improvement of management strategies and proper allocation of NPS resources, also resulting in long-term beneficial effects on park operations.

Park Unit	Cumulative Actions	Description of Impacts
New River Gorge National River	Urban development. Transportation infrastructure improvements; mined land reclamation and acid mine drainage.	Improvements to park operations following transportation and infrastructure projects would have long-term indirect beneficial effects resulting from decreased administrative burden over time. Mine-land reclamation and acid-mine drainage issues contribute to increased administrative burden on park management and operations and increased costs associated with on-going resource protection.
Obed Wild and Scenic River	Ongoing DOI injury quantification and restoration planning as a result of the 2002 oil spill and subsequent fire at the Howard/White Unit No. 1 Oil Well.	Increased administrative burden on park management and operations and increased costs associated with administrative actions aimed at cleanup of contamination and on-going resource protection.

Overall, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units, depending on the stage of the activity and whether it is increasing or decreasing (or remaining constant). Implementation of the current 9B regulations on regulated operations is contributing somewhat to the existing administrative burden of park resource staff in the seven category 1 park units, even while exempt operations do not consume administrative resources until they enter the plugging and reclamation phase unless they are identified as a significant threat of damage to park resources. The no-action alternative would continue to contribute to adverse cumulative effects on park management and operations, through costs associated with administrative action, into the foreseeable future. However, because oil and gas management responsibilities contribute a sizeable increment to park management and operational responsibilities, particularly for category 1 park units, the contribution to cumulative impacts of the no-action alternative would be adverse in the context of the entire suite of administrative responsibilities for park resource staff at each of the park units. Such impacts would likely be greater to park operations for those units with a high number of current and/or exempt operations and for those units which exhibit a greater potential for future operations due, for instance, to their proximity to Marcellus shale.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or approval process for permits, required operating standards, or required mitigation measures for operations. Impacts on park management and operations would be the same as those described under alternative A.

Previously Exempt Operations

Compared to the existing condition, some incremental contributions to existing FTE staff hours would be required to meet the obligation of the park unit to administer to the previously exempt oil and gas operations that would be regulated under the revised 9B regulations. For all of these operations, operators would be required to submit information necessary for the NPS to evaluate site conditions and identify appropriate mitigation measures to be included in the operations permit. The NPS is expected to incur the cost equivalent of one full-time employee (GS-12) including expenses for 1 year to oversee the conversion of grandfathered to regulated status. This is a one-time expenditure and amounts to approximately \$160,000 or \$700 per well site. It is assumed, however, that any additional responsibilities involved in addressing new operations would fall under the existing workload of dedicated park and

central office resource protection specialists and may require additional FTE or other administrative or material resources.

Directional Drilling

With no substantive change to the regulations for directional drilling under alternative B, impacts on administrative resources would be the same as described under alternative A, with minimal additional impacts on NPS staff or administrative resources, compared to the existing condition.

Financial Assurance

According to NPS estimates (see the “Socioeconomics” section), there are approximately 150 operations with a shortfall in bonding coverage of \$12 million. It is possible that operators will plug and reclaim marginally producing or idle wells to avoid these bonding costs, and this is likely to occur sooner under alternative B than under alternative A. As a result, the potential for additional financial and administrative burden on NPS parks would be greatly reduced. This would result in long-term beneficial impacts on park management and operations under alternative B compared to the existing condition.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. As a result, the existing risk of the NPS assuming the financial costs of reclamation would be removed. Since there have been no situations where this has occurred, closure of this regulatory gap, while it removes the minimal risk of such an occurrence, would not result in any change to dedicated funding or FTE staff and resources to perform the activities related to the management of oil and gas operations at NPS parks. Thus, under alternative B, the removal of the potential for this additional administrative burden would result in no impacts on park operation and management.

Enforcement and Penalties

Under alternative B, the new penalty provision that would be established would provide incentives for an operator to comply with the 9B regulations. NPS park resource specialists tasked with administering to compliance issues would be able to more effectively implement the 9B regulatory requirements as a result of this modification. This would result in beneficial effects upon park management and operations as a result of the reduced burden on park staff and resources. It is assumed, moreover, that any additional responsibilities involved in addressing minor acts of noncompliance would fall under the existing workload of dedicated park resource protection specialists and would not require additional FTE or other administrative or material resources.

Compensation for Access across Federally Owned Land

Under alternative B, compensatory reclamation activities may be done in lieu of an access fee. This may reduce the potential for additional financial and administrative burden on NPS parks occurring from inadequate funds to complete maintenance and repairs, although there may be administrative costs to manage these activities. Although procedural requirements related to the receipt of compensation would result in additional administrative costs to manage these activities, such administrative burdens would be minimal. Overall, this would result in both beneficial and slightly adverse impacts on park management and operations, and the overall effect on the park budget should be neutral.

Cost Recovery

Under alternative B, NPS can collect monies for processing the operations permit and for the purpose of park maintenance and other improvements within the associated park. This provision specifies that any permit fees would come back to the park unit instead of flowing to the general treasury.² The permit fees would be designed to recover the costs of the NPS permit administration and ongoing monitoring of the operation. As a result, the fees would include both one-time fees as well as a recurring fee to cover the costs of monitoring the site. The one-time fee would vary largely depending on the complexity of the permit, site location, and proximity to sensitive resources (i.e., species habitat, wetlands and water features, cultural resources, etc.). The one-time fee is expected to range from \$500 to \$5,000, depending on the NPS time needed to process the permit. As a result of this provision, the potential for additional financial and administrative burden on NPS parks occurring from the lack of additional money into the NPS permitting, monitoring, and compliance programs would be reduced. This would result in long-term beneficial impacts on park management and operations under alternative B, compared to the existing condition.

Cumulative Impacts of Alternative B

Under alternative B, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario. These are described under alternative A and would be the same under alternative B. Alternative B would contribute to cumulative impacts from the continued administrative need to oversee permitted operations, which would have adverse impacts on park management and operations, as described in the above analysis. Additionally, bringing previously exempt operations under regulation would add some administrative burden on park resource staff pertaining to the requirements entailed in overseeing permitting and inspections of newly nonexempt oil and gas operations. However, it is assumed that any additional responsibilities involved in attending to these new operations would fall under the existing workload of dedicated park resource protection specialists and would not require additional FTE or other administrative or material resources. Thus, the contribution to cumulative impacts of alternative B would be small but noticeable, given the wider context of cumulative actions affecting park management and operations. Impacts would likely be greater to park operations for those units with a high number of current and/or exempt operations and for those units which exhibit a greater potential for future operations due, for instance, to their proximity to Marcellus shale.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption criteria is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on park management and operations would be similar as those described for alternative B. Some

² A policy waiver would be required after the proposed 9B rule is promulgated allowing the fees from these oil and gas permits to be used by the appropriate park unit.

incremental contributions to existing FTE staff hours would be required to meet the obligation of the park unit to administer to the previously exempt oil and gas operations that would be regulated under the revised 9B regulations. The NPS is expected to incur the cost equivalent of one full-time employee (GS-12) including expenses for one year to oversee the conversion of grandfathered to regulated status. This is a one-time expenditure and amounts to approximately \$160,000 or \$700 per well site. It is assumed, however, that any additional responsibilities involved in addressing previously exempt operations would fall under the existing workload of dedicated park and central office resource protection specialists and may require additional FTE or other administrative or material resources.

Directional Drilling

The regulation of directionally drilled wells under alternative C would likely remove a key incentive for operators to locate operations outside of park units. Impacts on park management and operations would be adverse as a result of the additional burden of administering to 9B compliance needs and ensuring that operating standards are met for operations occurring beyond park boundaries which would come under the NPS regulatory authority with the implementation of alternative C. Additionally, operators would not have the cost incentive to locate new operations outside of the park boundaries. As a result, there could be new operations that would have been directionally drilled outside of the park boundary to access mineral resources which would choose instead to locate wells within the park boundaries since the same 9B compliance costs and delays would be incurred in either location. The addition of directionally drilled operations that would previously have opted to locate outside of park boundaries but would now be located within the park would create some additional review and work for park staff, the increase in existing workload of dedicated park resource protection specialists and may require additional FTE or other administrative or material resources. However, given the number of wells that may fall into this category, it is assumed that any additional responsibilities involved in addressing directionally drilled operations that now are located in the parks would likely be completed under the existing workload of dedicated park and central office resource protection specialists and would probably not require additional FTE or other administrative or material resources.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision is expected to motivate noncompliant operators, as well as mineral owners, to respond quickly to avoid penalties and provide an incentive to comply with the 9B regulations. NPS park resource specialists tasked with administering to compliance issues would be able to more effectively and efficiently implement the 9B regulatory requirements as a result of this modification. This change would not result in any effect upon parks to fulfill their administrative obligations and, thus, no impacts on park operation and management would occur. It is assumed that any additional responsibilities involved in addressing operators' and owners' liabilities for noncompliance and cleanup of sites would fall under the existing workload of dedicated park resource protection specialists and would not require additional FTE or other administrative or material resources. Moreover, more efficient implementation of the 9B regulatory requirements as a result of this modification would free staff to better address other management obligations.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be the same as described under alternative A. Similar to alternative B, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario. Alternative C would contribute to cumulative impacts from the continued administrative need to oversee permitted operations, which would have adverse impacts on park management and operations, as described in the above analysis. Bringing previously exempt operations under regulation would add some relatively small administrative burden on park

resource staff pertaining to the requirements entailed in overseeing permitting and inspections of oil and gas operations. Moreover, the addition of directionally drilled operations that would previously have opted to locate outside of park boundaries but would now be located within the park would further contribute to this burden. Additional responsibilities involved in attending to new operations would increase the existing workload of dedicated park resource protection specialists and would require additional FTE or other administrative or material resources. Overall, however, the contribution to cumulative impacts of alternative C would be small but noticeable, given the wider context of cumulative actions affecting park management and operations. Impacts would likely be greater to park operations for those units with a high number of current and/or exempt operations and for those units that exhibit a greater potential for future operations due, for instance, to their proximity to Marcellus shale.

CONCLUSION

Alternative A

Under the no-action alternative, current implementation practices among park resource specialists pertaining to the 9B regulations would continue and there would be no change in the administration of currently regulated and exempt operations. Thus, alternative A would result in no change to park management and operations. The costs to the NPS in terms of staff and resources of ensuring operational compliance with 9B requirements would continue under alternative A, and would result in long-term adverse impacts on park management and operations, although these impacts would be minimal. Impacts of the current regulatory provisions regarding financial assurance, financial liability of owners, compensation for use of federal property, and enforcement and penalties would continue to have the potential for additional administrative burden and expanded responsibilities placed upon NPS park resource specialists and would result in adverse effects to park operations and management. Because the alternative A would not change any impacts to park management and operations and impacts are generally manageable and minimal, these impacts would not be significant.

Alternative A would contribute only slightly to adverse cumulative impacts occurring to park management and operations as a result of cumulative plans and actions. Adverse impacts of oil and gas development would be localized and limited in duration and severity, and would therefore not contribute significantly to overall cumulative impacts.

Alternative B

Under alternative B, by comparison, the administration of the 9B regulations to previously exempt operations would require the use of park staff and resources, resulting in an increased administrative burden compared to the existing condition. However, any additional responsibilities involved in addressing new operations would fall under the existing workload of dedicated park and central office resource protection specialists. Provisions for cost recovery and compensation for access across federally owned lands would result in the potential for a reduced financial and administrative burden, resulting in long-term beneficial impacts on park management and operations. Additionally, any additional administrative responsibilities related to implementing the 9B regulations under alternative B would fall under the existing workload of dedicated park resource protection specialists and would not require additional FTE or other administrative or material resources. Because alternative B would result in primarily beneficial effects – particularly due to the regulation of previously exempt wells, and any adverse effects of regulated operations would be very limited in extent and not require substantial funding or staffing, the impacts of this alternative would not be significant.

Within the broader context of all cumulative plans and actions affecting park management and operations, implementation of alternative B would contribute a small but noticeable amount to adverse and beneficial

cumulative impacts. Impacts would likely be greater to park operations for those units with a high number of current and/or exempt operations and for those units which exhibit a greater potential for future operations due, for instance, to their proximity to Marcellus shale. Adverse impacts of the additional staff and operational need would be minimal and would not be significant.

Alternative C

Under alternative C, similar to alternative B, the addition of directionally drilled operations that would previously have opted to locate outside of park boundaries but would now be located within the park would further contribute additional responsibilities involved in attending to new operations, and would increase the existing workload of dedicated park resource protection specialists when compared to the existing condition. However, this would not likely require additional FTE or other administrative or material resources. Any additional responsibilities involved in addressing new operations would fall under the existing workload of dedicated park and central office resource protection specialists. Provisions for cost recovery and compensation for access across federally owned lands would result in the potential for a reduced financial and administrative burden, resulting in long-term beneficial impacts on park management and operations. The potential degree of administrative burden would increase under alternative C, as both operations previously exempt from the 9B regulations as well as those operations utilizing directional drilling to access private minerals under the incentive to locate outside of the park administrative boundaries, would require the regulatory oversight of the NPS.

The contribution to cumulative impacts of alternative C would be small but noticeable, given the wider context of cumulative actions affecting park management and operations. Adverse impacts of the additional staff and operational need would be minimal and would not be significant.

SOCIOECONOMICS

METHODOLOGY

Socioeconomic resources that are being analyzed in this EIS include (1) oil and gas operator costs and project financial viability; and (2) local and regional economies. Potential impacts on socioeconomic resources are assessed based on the impacts that 9B compliance would have on operator costs and project viability. Impacts associated with local and regional economies are tied to project viability and production for affected operations. A key component of assessing impacts to local and regional economies is the expectation that implementation of either action alternative would not affect the level of new development or the volume of oil and gas production.

The primary method for assessing impacts on operators and project viability include describing the potential 9B compliance costs, as described in the NPS cost-benefit and regulatory flexibility analysis (NPS 2014) and identifying the number of operations and operators affected. In addition, the analysis considers the compliance cost in the context of average annual operating receipts, expenses, and profits. Impacts on local and regional economies are based on an assessment of the impact that the 9B compliance costs have on financial viability of the operation and the relative importance of production levels within the park. Socioeconomic impacts on new operations as a result of 9B compliance costs are described qualitatively.

The degree of potential impacts on local and regional economies from 9B compliance costs depends on level of expenditures within the local economy, the impact of costs on project viability, the relative level of oil and gas activity in surrounding areas, and many other factors. Oil and gas production and development activity within the park, within the region, and within the state can provide an indication of how important the NPS oil and gas activities are to the surrounding counties and the state. The NPS

estimates production volumes from wells in parks using actual well production reports, average production/well in a county or district, or by analogy to similar parks (O'Dell 2012c). Production of currently regulated and exempt wells was estimated through a proportion of the number of regulated and exempt wells at each park. Data on oil and gas production and number of producing wells at the state level was obtained from the U.S. Energy Information Administration. County level oil and gas information was obtained from state sources and other reports, as referenced. Data was not available at the county-level for a few parks, including Big South Fork National River and Recreation Area.

As a result, a quantitative analysis is provided on 9B compliance costs on a per well/operation basis, if possible, and aggregated to reflect costs across all parks. Some costs, such as those to comply with financial assurance, are provided for all operations because average costs were not applicable. Impacts on local and regional economies are described qualitatively with county- and state-level data for support, where available.

People can attribute values and benefits to experiences of the environment, uses of natural resources, or the existence of particular ecological or environmental conditions, which often-times do not involve market transactions, and therefore lack prices. These nonmarket values for improved environmental qualities can be considerable but are often difficult and time-consuming to estimate. As a result, these values are described briefly in this methodology section and are further described in the relevant sections in the document, including visitor use and experience, geology and soils, water resources, health and safety, etc.

The current 9B regulations provide benefits to natural resources, the environment, and ecosystem services, including resource protection, visitor experience and recreation values, health and safety, soils, water resources, aesthetics, and others. These benefits apply to all situations where the 9B regulations are implemented. Conversely, where the 9B regulations are not applicable, there could be unnecessary adverse effects on natural resources, the environment, and ecosystem services. For example, currently exempt operations have the potential for continuing adverse impacts from improper operations, which could lead to spills, leaks and other releases of oils, produced water, or other chemicals that can contaminate soils and other park resources. Releases of oils or chemicals have contaminated resources and have not been cleaned up because of lack of regulation and oversight. These continuing environmental adverse effects can adversely affect the nonmarket values that the park provides (i.e., visitor use and experience, aesthetics and viewscapes, geology and soils, water resources, health and safety, and others).

STUDY AREA

The study area for socioeconomics includes the category 1 and 2 park units listed in table 1 in chapter 1 and communities and areas adjacent to the park units supporting oil and gas operations.

IMPACTS OF ALTERNATIVE A: NO ACTION

Both permitted and exempt oil and gas operations contribute to local and regional economies. Currently regulated operations pose additional costs to operators to comply with the current 9B regulations. Typical socioeconomic impacts associated with oil and gas activity located within parks include economic benefits, including jobs, income, taxes, and sales. The decision to develop and operate in an area is based on the financial viability of the operation or new investment. Operators assess individual well and field economics, such as the revenues or value of production, capital investment and other upfront costs, on-going production costs, and costs of plugging and abandonment in their decision. In addition to complying with many local, state, and federal regulations for oil and gas activity, the oil and gas industry

currently faces additional costs to comply with the 9B regulations in parks compared to operating on lands outside of park units.

Typical Impacts of Oil and Gas Operations on Socioeconomics

Operator Costs and Project Financial Viability

Currently regulated operators incur costs and processing time to prepare Plans of Operations and Applications, to obtain NPS permits, to secure performance bonds, to implement operating and mitigation measures beyond those required by other federal, state, and local laws and regulations, and to reclaim sites to NPS standards. This holds true for the following phases of exploration and production:

- Permitting
- Exploration and development, including drilling and completion
- Construction of well pad and roads
- Capital investments for other infrastructure (gas pipelines, storage tanks, compliance equipment, etc.)
- Recompletion investments (as needed)
- Operational or production costs (water costs, compliance costs, inspection and monitoring costs, etc.)
- Plugging, abandonment, reclamation

Although these administrative and operational costs are obviously an important part of the decision to develop wells and/or continue production for existing wells, the price of oil and gas is an essential factor. A third component is the operational and geological risk assessment that exploration and drilling will lead to successful oil and gas production, and if so, at what level.

Local and Regional Economies

Oil and gas exploration and development support jobs and income in nearby communities for drill rig operators, geophysical seismic companies, construction companies, landmen, and oil and gas support companies that complete wells, among others. Oil and gas production supports industry jobs, including inspecting and maintaining equipment and operations, complying with mitigation standards and other on-going production and operational needs. These residential and nonresidential workers spend their wages in local and regional communities, supporting downstream jobs and income. Oil and gas production also provides economic benefits to oil and gas companies, benefiting economies where these companies are headquartered and the nation overall. Many energy-related jobs provide higher wages and earnings than service sector jobs.

During production, the oil and gas value of production is often taxed through severance taxes and ad valorem taxes, although these taxes vary by state. Additionally, local governments often benefit from property and sales and use taxes on oil and gas equipment. These tax receipts typically benefit state and county agencies, providing funding for schools, roads, social services, and other public service and infrastructure.

Regulated Operations (Current and Future)

Under alternative A, regulated operations would continue to be subject to the current 9B regulations with implications for operator costs, project financial viability, and local and regional economies. There are 215 existing regulated operations in 7 parks, as described in table 2.

Operator Costs and Project Financial Viability—The 9B regulations require that the oil and gas operations comply with NPS operating, plugging, and reclamation standards. Operators are also required to maintain performance bonds or an equivalent surety (covered in a subsequent section). The permitting and drilling costs, described above, have already been incurred for these operators.

The costs for the NPS to meet 9B operational standards would continue under alternative A for these operations, including costs for site security and public safety, pressure and flow control equipment; produced water storage and disposal; maintenance of access roads and pads, including vegetation management; among others. These standards for producing wells are estimated to increase operational costs up to \$2,000 for initial installations with an average of \$500 per year per operation annual maintenance. With 215 currently regulated wells, this amounts to approximately \$108,000 in additional average costs for currently regulated oil and gas operations combined (NPS 2014). Currently regulated operations are expected to continue under alternative A, incurring additional production costs to comply with 9B regulations. However, these average operating costs are typically a small fraction of overall costs and thus result in negligible to minimal adverse impact on operators. As wells come to the end of their productive life, these costs can become economically significant on an individual well or lease basis as production declines and profit margins decrease. As a result, marginally producing wells may be plugged and reclaimed when regulatory and environmentally sound operating costs exceed revenues.

Once the currently regulated operations move into the plugging and reclamation stage of operation, they are required to adhere to additional 9B requirements that ensure that wells sites are plugged and reclaimed properly. Meeting the NPS requirements of leaving the site in a clean and safe condition in preparation for surface reclamation often involves placing liners underneath plugging equipment, using steel tanks instead of earthen pits, removing ground structures, equipment, and debris, restoring natural contour of the land, and reestablishing native vegetative communities. NPS also requires the routine testing of plugs required to isolate and protect usable quality water zones to verify they have been set at the correct depth and provide the intended wellbore isolation. Based on NPS analysis of costs in existing plans of operations and NPS experience with these activities, these additional plugging and reclamation costs are estimated to be \$30,000 per well, which includes additional plugging and testing costs of \$7,000 and \$23,000 for additional surface reclamation costs (NPS 2014). The total cost to plug and reclaim wells can vary considerably, and as a result, the 9B compliance costs vary in terms of the proportion of total plugging and reclamation costs.

It should be noted that grandfathered operations can lose their status and become subject to current 9B regulations under two conditions: (1) if the operatorship is transferred to another operator (the exemption is for the operator, not the operation); or (2) when the operator applies for a permit to the state or federal government (for example, for plugging a well). States typically require permitting and notification to plug and abandon wells. As a result, grandfathered status is invariably lost when an operator moves to the plugging and reclamation phase, and therefore grandfathered wells are generally plugged and sites reclaimed to NPS standards under the current 9B regulations. Based on historic averages and trends, the NPS has found that approximately 4 wells are plugged and reclaimed per year, which includes currently permitted and grandfathered operations (NPS 2014). With 4 wells plugged and reclaimed per year, the total costs of meeting these standards is approximately \$120,000 per year and would vary depending on the operation.

There are 31 operators that account for the regulated operations across the parks, most of which are small businesses (see the “Socioeconomics” section of chapter 3 and NPS 2014). Annualized operational costs of \$108,000 for 31 companies are \$3,484, which represents approximately 0.02 percent of average receipts for small companies (under 50 employees) in the oil and gas extraction sector (NPS 2014; U.S. Economic Census 2007). If \$30,000 plugging and reclamation costs are added to the operating costs, these additional costs (total of \$33,484) account for 0.2 percent of all average annual receipts for small businesses in this sector, which suggests that these 9B compliance costs have a negligible impact on operator costs and project viability.

Local and Regional Economies—Production of regulated and exempt wells accounts for approximately 614,000 barrels of oil and 6,236 MMcf (million cubic feet) of natural gas annually across the category 1 park units in 2012, as shown in table 27 in chapter 3. The currently regulated operations produce an estimated 587,000 barrels of crude oil and 4,728 MMcf of natural gas annually across seven of the category 1 park units with production from regulated operations. This represents 0.03 percent of crude oil and 0.02 percent of natural gas produced in the U.S. in 2011 (U.S. Energy Information Administration 2013).

The parks with regulated operators account for a very small proportion of the associated state’s production, with the exception of Big Cypress National Preserve, which has oil production accounting for 26.5 percent of Florida’s oil production and 0.3 percent of its natural gas production. Lake Meredith National Recreation Area, with the greatest number of regulated operations, accounts for an estimated 0.1 percent of Texas’ natural gas production. There are economic benefits associated with continued production of oil and gas from 215 regulated operations, although these benefits would bring limited local and regional jobs since the activity is small relative to the other regional production and oil and gas activity within the regions. The exception is currently regulated operations in Big Cypress National Preserve, which is estimated to produce 535,000 barrels of oil per year. Although a relatively large amount of oil production for Florida, this economic activity is still small considering south Florida’s vast and diversified economy and relatively small oil production figures (Florida ranks 44th in state oil production).

Additionally, there is considerable oil and gas activity within the counties surrounding and encompassing these parks, as shown in table 70. In most cases, the production from park regulated operations accounts for less than 2 percent of surrounding county production. The exception is in Lake Meredith, where regulated operations account for 5.6 percent of natural gas production in Hutchinson, Potter, and Moore counties in Texas. As a result, these regulated operations contribute to local economies, but the contribution is very small in the local, regional and state context.

Fiscal benefits, such as ad valorem and severance tax receipts, associated with this production would benefit local and state economies. Since production is a relatively small proportion of state and county production, these benefits would be minimal to state and local governments. The exception is production in Big Cypress National Preserve, which is likely to contribute taxes on its production. However, within the large Miami-Naples and southern Florida economy, these contributions are small. For rural counties who rely on this tax income, production revenues from these regulated operations may be relatively more important. Communities and counties surrounding the parks with the greatest regulated operations would benefit, including Lake Meredith National Recreation Area, Big Thicket National Preserve, Big Cypress National Preserve, and Alibates Flint Quarries National Monument. However, all of the counties surrounding and encompassing these parks have considerable oil and gas activity, and as a result, these economic contributions represent a small portion of local and regional oil and gas fiscal revenues.

TABLE 70. CURRENT PRODUCTION IN PARKS AND COUNTIES (REGULATED PRODUCTION)

Park Unit	Counties	Annual Oil Production from Park Regulated Operations (Barrels) (% of County)	Annual Natural Production from Park Regulated Operations (MMCF) (% of County)	2012 County Oil Production (Barrels)	2012 County Gas Production (MCF)	Drilling Permits Issued in 2012 Unless Noted
Alibates Flint Quarries	Potter County, Texas	2,920 (1.7%)	164 (1.6%)	180,009	10,347,713	10
Aztec Ruins National Monument	San Juan County, New Mexico	274 (0.0%)	196 (0.0%)	1,191,945	480,000,000	11 applications for permits to drill since beginning of 2013
Big Cypress National Preserve	Collier County, Florida	535,455	43	NA	NA	4 drilling permits issued and 4 permits currently being applied for
Big Thicket National Preserve	Jasper, Jefferson, Liberty, Orange, Polk, and Tyler Counties, Texas	34,628 (0.9%)	693 (0.5%)	3,875,014	139,656,849	287 in 2012
Cuyahoga Valley National Park	Cuyahoga and Summit Counties, Ohio	183 (0.0%)	5 (0.0%)	463,426	10,779,854	33 wells drilled in 2011
Lake Meredith National Recreation Area	Hutchinson, Moore, and Potter counties, Texas	13,950 (1.1%)	3,627 (5.6%)	1,222,209	47,508,052	165 in 2012
Padre Island National Seashore	Kenedy and Willacy counties, Texas	No Production (0.0%)	No Production (0.0%)	366,705	39,448,640	NA

Sources: Ohio Department of National Resources, Division of Oil and Gas 2013; Railroad Commission of Texas 2013. New-mexico-drilling.com 2013. www.texas-drilling.com 2013; Florida Department of Environmental Protection 2013; O'Dell 2013c.

Production from regulated operations also provides royalty revenues to leaseholders. Operators lease mineral interests from private mineral owners, and the lessees become royalty interest owners and receive royalties from the production associated with these minerals. Given the relatively small amount of production from regulated operations within the park regions, these royalties are not likely to provide considerable income benefits within the local and regional economies. However, these royalties are important to individual leaseholders with royalty interests and vary based on specific financial situations.

Currently Exempt Operations

Under the no-action alternative, existing access exempt and existing grandfathered operations are not subject to NPS operating standards and mitigation measures. Therefore there is no effect on project viability or local and regional economies from the current 9B regulations.

Access-exempt operations are outside the scope of the current 9B regulations and do not need to meet NPS standards. These operations do, however, have the potential to adversely affect federally owned or administered lands or waters. Currently there are 78 access-exempt operations in three of the category 1 park units, as described in table 2.

Grandfathered operations are addressed under the current regulations as “existing operations” at 36 CFR 9.33. Grandfathered operations do not need to meet NPS operating standards unless they pose a threat of significant injury to park resources. These operations do, however, have the potential to adversely affect federally owned or administered lands or waters. Currently there are 241 grandfathered operations in 8 of the category 1 park units, as described in table 2.

Operator Costs and Project Financial Viability—Since exempt operations do not need to comply with NPS permitting, operating standards, plugging and reclamation (with the exception of grandfathered operations), and bonding requirements, they would not incur any compliance costs to meet these requirements under alternative A. Therefore, there would be no adverse effects to project costs associated with alternative A.

Local and Regional Economies—The exempt oil and gas operations, approximately 64 percent of current operations within the category 1 park units, benefit local communities through jobs, income, and tax receipts. However, as shown in table 32 in chapter 3, production from the currently exempt operations accounts for a small proportion of production in the associated states and across the nation. The exempt operations produce an estimated 27,000 barrels of crude oil and 1,500,000 mcf (thousand cubic feet) of natural gas annually. This represents 0.001 percent of crude oil and 0.006 percent of natural gas produced in the U.S. in 2011 (Energy Information Administration 2013).

The parks with exempt operations account for a very small proportion of the relevant state’s production, with each park accounting for less than 1 percent of the associated state(s) production. There are economic benefits associated with continued production of oil and gas from the 319 exempt operations, although these benefits would be small within the regional context since park production accounts for minimal production within the states.

The bulk of production from exempt operations is in Big South Fork National River and Recreation Area, Cuyahoga Valley National Park, Gauley River National Recreation Area, Lake Meredith National Recreation Area, and Aztec Ruins National Monument. All of the counties surrounding and encompassing these parks have considerable nonpark oil and gas activity as shown in table 71, although some county-level production statistics are not available (e.g., for Tennessee). Lake Meredith gas production from exempt operations accounts for the highest proportion of the surrounding county production, 2.4 percent.

TABLE 71. CURRENT PRODUCTION IN PARK AND COUNTIES (EXEMPT OPERATIONS)

Park Unit	Counties	Annual Oil Production from Park Exempt Operations (Barrels) (% of County)	Annual Natural Gas Production from Park Exempt Operations (MMCF) (% of County)	2012 County Oil Production (MBO)	2012 County Gas Production (MMCF)	Drilling Permits Issued in 2012 Unless Noted
Aztec Ruins National Monument	San Juan County, New Mexico	91 (0.0%)	65 (0.0%)	1,192	480,000	11 applications for permits to drill since beginning of 2013
Big South Fork National River and Recreation Area	Scott, Fentress, Picket, and Morgan counties, Tennessee	14,600	88	NA	NA	38 drilling permits issued in 2010
Big Thicket National Preserve	Jasper, Jefferson, Liberty, Orange, Polk, and Tyler Counties, Texas	1,872 (0.0%)	37 (0.0%)	3,848	134,928	287 in 2012
Cumberland Gap National Historic Park	KY, TN, VA	No Production	18	NA	NA	NA
Cuyahoga Valley National Park	Cuyahoga and Summit Counties, Ohio	5,293 (1.1%)	131 (1.2%)	463	10,780	33 wells drilled in 2011
Gauley River National Recreation Area	Nicholas County, West Virginia	No Production	51	NA	NA	NA
Lake Meredith National Recreation Area	Hutchinson, Moore, and Potter counties, Texas	4,300 (0.4%)	1,118 (2.4%)	1,220	47,492	165 in 2012
Obed Wild and Scenic River	Morgan County, Tennessee	365	No production	NA	NA	12 drilling permits issues in 2010

Sources: Ohio Department of National Resources, Division of Oil and Gas 2013; Railroad Commission of Texas 2013; New-mexico-drilling.com 2013; www.texas-drilling.com 2013; Florida Department of Environmental Protection 2013; Avery 2009; Zurkowski 2011; O'Dell 2013c.

Additionally, many of the grandfathered wells, over 200 operations, are idle or have marginal production, bringing relatively less marketed value to operators (NPS 2014). Many of these wells are located in Big South Fork National River and Recreation Area and Cuyahoga Valley National Park. As a result, these exempt operations contribute to local economies, but the contribution is very small in the local and regional context.

Fiscal benefits, such as ad valorem and severance tax receipts, associated with this production would benefit local and state economies. Since production is a relatively small proportion of local and state production, these benefits would be small relative to other oil and gas receipts. For rural counties who rely on this tax income, production revenues from these regulated operations may be relatively more important. However, given the considerable oil and gas activity surrounding these parks, the fiscal contribution associated with the exempt wells would be small within the counties.

Production from regulated operations provides royalty revenues to leaseholders. Given the relatively small amount of production from exempt operations within the park regions, these royalties are not likely to provide considerable income benefits within the local and regional economies. However, these royalties are important to individual leaseholders with royalty interests, with the importance varying based on their specific financial situation.

Because of the relatively small amount of production currently exempt operations contribute within the regions around the parks, there would be little to no effect on local and regional economies.

Future Operations

New drilling in parks has largely been within areas that have required 9B permits and operating standards, with an average of 4 new wells drilled annually. Although there have been a few wells developed on private lands inside park boundaries in Big South Fork National River and Recreation Area, the overwhelming majority of new wells in NPS parks have been regulated under 9B regulations. Only one in 20 new operations within park boundaries has not been subject to 9B regulations during the past 5 years. Under alternative A, it is expected that most new development within park boundaries would be subject to the 9B regulations and would require that operators incur additional permitting and drilling costs as described in chapter 3. In general, these 9B compliance costs for drilling a new well are a one-time expense and can range from 5 to 10 percent of total drilling and completion costs (O'Dell pers. comm. 2013b).

There is an adverse effect on the costs to operators and project financials associated with the 9B compliance costs for new operations, demonstrated by operators' choice of locating operations outside park boundaries to access mineral interests. According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent of operations showed surface logistics that favored a location in the park, and logistics were neutral for another 37 percent of operations. Thus, only 26 percent of operations would have located outside of park boundaries. Stated another way, the vast majority of operations, or nearly three quarters of the total, would have located within the park boundaries if no NPS regulations existed (O'Dell pers. comm. 2013d).

Permitting and survey requirements as well as drilling and completion of new wells would continue under alternative A and would support jobs and income in adjacent communities. However, the beneficial impacts associated with permitting and drilling and completion activities from new regulated operations would be limited since only four wells are expected to be drilled per year, and these jobs and economic activity are temporary in nature.

Under alternative A, it is possible that mineral leaseholders underlying private lands within park boundaries may have a more difficult time leasing these rights to operators compared to leases outside of parks because 9B requirements could result in costs and delays to new oil and gas operations. As a result, leaseholders may receive less favorable bonus bids for leases than would occur for leaseholders underlying park lands outside of park boundaries.

Directional Drilling

Under the no-action alternative, the incentive for operators to locate their operations outside of park units would remain in place. Operators who would decide to directionally drill from outside the park boundaries would incur the additional drilling costs associated with directional drilling, but would not incur the costs of compliance with the current 9B regulations. Compliance costs and permitting delays associated with 9B regulations and additional NPS permitting requirements have currently provided a strong incentive for operators to locate operations outside of park boundaries, directionally drilling to access mineral interest below park lands when it is a feasible alternative (see discussion above on New Operations).

Project costs for directionally drilled operations would continue to adversely affect operators; however, these costs are lower than they would be if these operations were required to have a plan of operations under the 9B requirements. These activities would continue to support jobs, income, and tax receipts in local and regional economies.

Financial Assurance

Under the no-action alternative, NPS data indicates that the current financial assurance requirements are not sufficient to cover the full cost of reclamation for a majority of the currently regulated operations. Under alternative A, regulated operators are required to maintain a performance bond with a surety company. The annual cost for an operator to maintain a performance bond with a surety company varies substantially depending on an operator's credit standing, reserve base, and whether the bond is unsecured or collateralized. Based on discussions with Argo Surety, this analysis uses 3% of the bond amount as the annual cost of maintaining the financial assurance. Annual costs to operators for 215 regulated operations are estimated to be approximately \$80,000. In most cases, the costs of providing financial assurance would have a minimal impact on operator costs and financial viability. As margins and production decline, the additional cost to maintain the bond would become an economic factor and may provide an incentive for the operator to plug and reclaim the well. There would be no impacts on local and regional economies.

Financial Liability of Operators / Transfer of Interest

Under the current 9B regulations, a gap exists under the existing regulation. A prior owner who provides notice to the superintendent may request release of liability for financial assurance before the new owner posts its own financial assurance. However, this has not occurred under current conditions. Under the no-action alternative, when grandfathered operators transfer the interest to another operator, the exempt status is lost, and the operation would be subject to 9B regulations. The current transfer of interest requirements under the no-action alternative would absolve currently exempt operators from liability should an accident or incident occur during this regulatory gap, potentially benefiting these operators because of avoided reclamation costs. There are no impacts on regional economies associated with the transfer of interest provision.

Enforcement and Penalties

Under the no-action alternative currently exempt operations would not be subject to any penalties for minor acts of noncompliance in current and future operations, potentially benefiting operators for avoiding penalties and fees. There would be no anticipated impacts on local and regional economies associated with continued enforcement and penalties.

Compensation for Privileged Access across Federally Owned Land

Under the no-action alternative, the NPS can charge a registration fee for use of existing park roads, but park compensation for surface disturbance within park boundaries but outside the boundary of the mineral right has not been addressed, such as the need to build new road or to lay gathering lines outside an operator's mineral right. An operator has a right of reasonable access across the surface of the land within the boundary of the mineral right. However, under existing regulations, the NPS has, in all cases, allowed the access beyond the boundary of the mineral right, but has not required compensation. This has reduced relative access costs for oil and gas operators in NPS parks when compared to operations on private lands since private landowners would charge for access, surface damage payments, and development costs. Under the no-action alternative, these conditions would continue to occur, beneficially affecting operator costs for access to sites. There would be negligible effects to local and regional economies associated with the continuation of the registration fee for use of existing park roads.

Cost Recovery

Under the no-action alternative, the NPS does not recover costs for processing proposed plans of operations or monitoring approved operations for regulated operations. There would be no operator costs for cost recovery under the no-action alternative. This alternative does not provide for cost recovery, resulting in no impacts on operators or local and regional economies.

Cumulative Impacts of Alternative A: No Action

Actions inside and outside of the park units and local trends in oil and gas development can cumulatively affect impacts on local, regional, and national economies. Other past, present and future planned actions within and adjacent to parks have the potential to impact local and regional economies. Increased development within the park boundaries and in adjacent communities generally have beneficial impacts on local and regional economies. Recreation and visitor spending also beneficially affect local communities as visitors stay and spend their income in gateway communities. Actions that induce or discourage visitation and visitor spending can affect local economies.

Generally, economies are subject to business cycles with upturns and downturns affecting economic activity across most regional economies. To the extent that economic activity increases, there would be beneficial effects, and if it decreases there could be adverse effects to regional economies, affecting jobs, income, fiscal receipts, and downstream economic activity.

Oil and gas development and production are also affected by cumulative actions or circumstances, many of which are beyond the operators or NPS control, such as oil and natural gas prices, state oil and gas regulation, other development costs, the risks of successful well development, production costs, and many others. Other federal and state requirements can also cumulatively affect the costs of oil and gas operations within park boundaries, which can indirectly affect development and production decisions.

Past, present, and reasonably foreseeable activities are listed in table 72 that would have beneficial effects on local, regional, and national economies with increases in the activity listed, and conversely, would have adverse effects with decreases in the activity.

TABLE 72. CUMULATIVE IMPACTS ON SOCIOECONOMICS (PROGRAMMATIC LEVEL FOR CATEGORY 1 AND 2 PARK UNITS)

Past, Present, and Reasonably Foreseeable Activity	Impacts on Socioeconomics
NPS facility and road construction	Short-term beneficial effects on local and regional economies during construction associated with jobs, income, fiscal receipts, and the workforce spending wages in local economies supporting downstream economic activity. Construction activities can temporarily and adversely affect visitor experience and possibly visitation and visitor spending in local economies.
Vegetation management	Short-term and long-term beneficial effects on local and regional economies during management activities associated with jobs, income, and the workers spending wages in local economies supporting downstream economic activity. Habitat management activities if they temporarily disrupt park activities can adversely affect visitor experience and possibly visitation and visitor spending in local economies.
Trails development and maintenance	Short-term and long-term beneficial effects on local and regional economies during development and maintenance activities associated with jobs, income, and the workforce and personnel spending wages in local economies supporting downstream economic activity. Construction activities can temporarily adversely affect visitor experience and possibly visitation and visitor spending in local economies.
ORV use	ORV use can provide short- and long-term beneficial effects from visitor spending on local economies, but could also adversely affect non-motorized visitor experience possibly decreasing visitation and visitor spending for these types of visitors.
Abandoned mine lands reclamation	Short-term beneficial effects on local and regional economies during reclamation activities associated with jobs, income, and the workforce spending wages in local economies supporting downstream economic activity. Construction or reclamation activities can temporarily and adversely affect visitor experience and possibly visitation and visitor spending in local economies.
Mining and logging activities	Beneficial effects of mining and logging activities associated with jobs, income, fiscal receipts, and the workforce spending wages in local economies supporting downstream economic activity. Mining and logging activities can adversely affect visitor experience and possibly visitation and visitor spending in local economies.
Recreational use	Short- and long-term beneficial effects on jobs, income, and fiscal receipts from visitor spending on local economies.
Ranching, agricultural land uses	Beneficial effects of agricultural production and ranching activities associated with jobs, income, and the households spending wages in local economies supporting downstream economic activity.
Land development: residential and nonresidential (commercial, industrial) land uses, including road construction	Short-term beneficial effects on local and regional economies during construction associated with jobs, income, and the workforce spending wages in local economies supporting downstream economic activity. Construction activities can also temporarily and adversely affect visitor experience and possibly visitation and visitor spending in local economies. Changes in landscapes and views can adversely affect visitor experiences and possibly visitation and visitor spending in local economies.
Current and future oil and gas development and production on adjacent lands	Short- and long-term beneficial effects on local and regional economies during development and production associated with jobs, income, fiscal receipts, and the oil and gas workforce spending wages in local economies supporting downstream economic activity. Changes in landscapes and views can adversely affect visitor experiences and possibly visitation and visitor spending in local economies.

Past, Present, and Reasonably Foreseeable Activity	Impacts on Socioeconomics
Oil and gas well plugging and reclamation activities inside and outside of parks	Short-term beneficial effects on local and regional economies during plugging and reclamation activities associated with jobs, income, fiscal receipts, and the workers spending wages in local economies supporting downstream economic activity. Construction or reclamation activities can temporarily and adversely affect visitor experience and possibly visitation and visitor spending in local economies, although in the long-term these reclamation activities are expected to benefit visitors.
Other federal, state, and local requirements and authorities for oil and gas operations	<p>There are additional federal, state, and local requirements for oil and gas operations above and beyond those required for 9B compliance. Generally, these include state regulations related to erosion control, water discharge, and wildlife. Some federal permits are also required, such as ESA section 9 and U.S. Army Corps of Engineers 404 Permits for wetlands. Permitting and requirements for floodplain development are generally administered at the county-level. Although operators' expenditures to comply with these regulations benefit local economies through jobs and income opportunities, the increased permitting and operational costs can have adverse effects on operators and project financial viability.</p> <p>The park has the authority provided in the Park System Resource Protection Act (54 USC 100721), which authorizes NPS to seek civil damages, including the costs of response, assessment, and restoration, and to retain recovered costs for restoring injured resources. Cost recovery for accidents and incidents can have adverse effects on operators and project financial viability should these incidents occur.</p>

Cumulative Actions Specific to Category 1 Park Units with Exempt Operations

Table 73 includes an accounting of cumulative impacts that could affect socioeconomics in those parks with exempt operations that are being analyzed on a more site-specific basis. The programmatic level cumulative actions listed above also apply to these parks.

TABLE 73. CUMULATIVE IMPACTS ON SOCIOECONOMICS – CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Cumulative Actions	Description of Impacts
Aztec Ruins National Monument	Grazing; agricultural activities; residential development; road building; irrigation; visitor activities within the park.	Grazing and agricultural activities, residential development, construction activities, and visitor activities would have beneficial effects on local and regional activities through visitor spending, jobs and income opportunities. These activities, along with the environmental risks associated with the exempt operation, could also temporarily or permanently disrupt or obscure views and/or visitor experiences and possibly decrease visitation and visitor spending adversely affecting local and regional economies.
Big South Fork National River and Recreation Area	Agricultural and forestry operations; commercial and residential development; road construction; existing and future coal mining operations; visitor use; prescribed fires; plugging and reclamation of abandoned wells including 39 under ARRA funded program.	The agricultural, forestry, commercial and residential development, construction activities, prescribed fires, mining operations, and other plugging and reclamation activities would have beneficial effects on local and regional activities through jobs and income opportunities. These activities, along with the environmental risks associated with the exempt operations, could also temporarily or permanently disrupt or obscure views and/or visitor experiences, adversely affect park resources, water resources, soils, health and safety, and other nonmarket environmental values, and possibly decrease visitation and visitor spending adversely affecting local and regional economies.

Park Unit	Cumulative Actions	Description of Impacts
Big Thicket National Preserve	Actions include agricultural and forestry operations; urban and residential development; publicly owned facilities (water impoundments, water diversion structures, and sewage treatment); road construction; visitor use; plugging of abandoned wells under ARRA funded program.	Agricultural, forestry, urban and residential development, construction activities, and other plugging and reclamation activities would have beneficial effects on local and regional activities through jobs and income opportunities. These activities, along with the environmental risks associated with the exempt operations, could also temporarily or permanently disrupt or obscure views and/or visitor experiences, adversely affect park resources, water resources, soils, health and safety, and other nonmarket environmental values, and possibly decrease visitation and visitor spending adversely affecting local and regional economies.
Cumberland Gap National Historic Park	Park developments and visitor use; establishment of nearby State Parks. Continued management of recommended wilderness in accordance with Wilderness Act and NPS policies; acquisition of Fern Lake and surrounding area.	Park development, construction activities, and new visitor opportunities, would have beneficial effects on local and regional activities through jobs and income opportunities. These activities could also temporarily or permanently disrupt or obscure views and/or visitor experiences adversely affect park resources, water resources, soils, health and safety, and other nonmarket environmental values, and possibly decrease visitation and visitor spending adversely affecting local and regional economies.
Cuyahoga Valley National Park	Residential, commercial, and transportation related land development and construction outside the park; ongoing park operations and maintenance. Invasive and nonnative species management inside and outside of the park; land acquisitions and easements; agricultural use; deer management in and around park.	Agricultural use, commercial and residential development, construction activities, species and deer management activities would have beneficial effects on local and regional activities through jobs and income opportunities. These activities, along with the environmental risks associated with the exempt operations, could also temporarily or permanently disrupt or obscure views and/or visitor experiences, adversely affect park resources, water resources, soils, health and safety, and other nonmarket environmental values, and possibly decrease visitation and visitor spending adversely affecting local and regional economies.
Gauley River National Recreation Area	Urban development. Transportation infrastructure improvements; mined land reclamation.	Urban development, construction activities and infrastructure improvements, mined land reclamation activities would have beneficial effects on local and regional activities through jobs and income opportunities. These activities, along with the environmental risks associated with the exempt operations, could also temporarily or permanently disrupt or obscure views and/or visitor experiences, adversely affect park resources, water resources, soils, health and safety, and other nonmarket environmental values, and possibly decrease visitation and visitor spending adversely affecting local and regional economies.
Lake Meredith National Recreation Area	Actions include recreational activities; ranching and agriculture; residential development; road construction; water impoundments (i.e., Lake Meredith); recreational ORV use and other visitor use.	Ranching and agriculture, residential development, construction activities, and recreation opportunities and associated visitation would have beneficial effects on local and regional activities through visitor spending and jobs and income opportunities. These activities, along with the environmental risks associated with the exempt operations, could also temporarily or permanently disrupt or obscure views and/or visitor experiences, adversely affect park resources, water resources, soils, health and safety, and other nonmarket environmental values, and possibly decrease visitation and visitor spending adversely affecting local and regional economies.

Park Unit	Cumulative Actions	Description of Impacts
New River Gorge National River	Urban development. Transportation infrastructure improvements; mined land reclamation.	Urban development, construction activities and infrastructure improvements, mined land reclamation activities would have beneficial effects on local and regional activities through jobs and income opportunities. These activities, along with the environmental risks associated with the exempt operations, could also temporarily or permanently disrupt or obscure views and/or visitor experiences, adversely affect park resources, water resources, soils, health and safety, and other nonmarket environmental values, and possibly decrease visitation and visitor spending adversely affecting local and regional economies.
Obed Wild and Scenic River	In 2002, an oil spill and subsequent fire occurred during the exploratory drilling for a well located adjacent to the boundary of the Obed Wild and Scenic River (the Howard/White Unit No. 1 Oil Well). The Natural Resources Damage Assessment — Pre-assessment Phase Report was prepared after collecting data that were necessary for determining the fate and effects of the spilled oil, reviewing the results and analyzing the data, compiling the administrative record, and determining that there was injury or potential injury to resources or services potentially affected. The DOI is proceeding with injury quantification and restoration planning to develop alternatives that would restore, replace, or acquire the equivalent of natural resources injured and/or natural resources lost as a result of this incident.	Park visitation and reclamation activities would have beneficial effects on local and regional activities through jobs and income opportunities. The oil spill, along with the environmental risks associated with the exempt operations, would have adverse effects on park resources, water resources, soils, visitor safety, and visitor experiences, and possibly decrease visitation and visitor spending adversely affecting local and regional economies.

Current and future oil and gas development can contribute to cumulative impacts on socioeconomic resources. Energy development on lands adjacent to NPS lands is expected to continue into the foreseeable future. The exploration and production of shale gas, in particular, is anticipated to increase dramatically over the next 30 years. The U.S. Energy Information Administration's Annual Energy Outlook 2013 Early Release projects U.S. natural gas production to increase from 23.0 trillion cubic feet in 2011 to 33.1 trillion cubic feet in 2040, a 44 percent increase. Almost all of this increase in domestic natural gas production is due to projected growth in shale gas production, which grows from 7.8 trillion cubic feet in 2011 to 16.7 trillion cubic feet in 2040 (EIA 2013). Shale gas is found in shale "plays," which are shale formations containing significant accumulations of natural gas and which share similar geologic and geographic properties. Current and prospective shale plays that underlie or are located near category 1 park units include the Utica (which underlies Cuyahoga Valley National Park); Marcellus (which underlies Gauley River National Recreation Area and New River Gorge National River); Chattanooga (which underlies Big South Fork National River and Recreation Area and Obed Wild and Scenic River); and Tuscaloosa (which lies near Big Thicket National Preserve). Category 2 park units are also located above and adjacent to shale plays and considerable oil and gas reserves (see figure 7).

Because shale gas resources are near many of the category 1 and 2 park units, this increase in exploration and production activities represents a cumulative action surrounding the parks. Oil and gas activities beneficially impact jobs, income, fiscal receipts and downstream economic activity in local and regional economies. However, rapid development in some areas can cause adverse social and economic effects as communities struggle to support the development, including housing availability, cost of living increases, aesthetic and visual impacts, public and community service capacity concerns, traffic and congestion, and others. It could be the case that the industrialization of the greater region would make the adjacent parks less attractive to visitors, and as a result, decrease visitor experience and possibly visitation and visitor spending, adversely affecting local and regional economies. On the other hand, as surrounding regions experience additional oil and gas activity, park resources, such as natural views and landscapes and recreational opportunities, would become relatively more valuable to visitors if these amenities and services decrease in surrounding regions.

Overall, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units depending on the stage of the activity and whether it is increasing or decreasing (or remaining constant). Implementation of the current 9B regulations on regulated operations is likely having adverse impacts on costs for operations in the seven category 1 park units, while exempt operations do not incur these regulatory costs.

Both the regulated and exempt operations are currently benefiting local and regional economies in adjacent communities, although their production is fairly minimal within the local and state context. Additionally, oil and gas production supports ad valorem and severance taxes, benefitting communities, counties, and sometimes states, although this is also small within the local and regional context. The no-action alternative would continue to have adverse effects on operator costs and financial viability and beneficial effects on economic activity in local and regional economies into the foreseeable future. However, the contribution to cumulative impacts of the no-action alternative would be slight given the considerable oil and gas development occurring in the regions outside of park boundaries, additional federal, state, and local oil and gas permitting and operational requirements, and the many other cumulative impacts affecting operator costs and local and regional economies.

IMPACTS OF ALTERNATIVE B: PROPOSED RULE (PREFERRED ALTERNATIVE)

Regulated Operations (Current and Future)

There would be no change under alternative B regarding requirements or the approval process for permits, required operating standards, or required mitigation measures for previously regulated operations. As noted in the beginning of this chapter, revisions to existing regulations pertaining to operating standards include codifying those standards that are currently recommended by NPS and have been routinely followed to meet the least damaging methods approval standard. Because adherence to these standards, while not codified, is already standard practice, this regulatory revision would not result in any incremental changes to operator costs or project financial viability of currently regulated operations, with no change in impacts on local and regional economies compared to the existing condition. Impacts on socioeconomics from permitted operations would remain the same as those described for alternative A, with additional compliance costs having varying adverse impacts on operator costs and project financial viability and regulated operations beneficially affecting local and regional economies. These benefits are small compared to oil and gas activities in regions surrounding these parks.

Previously Exempt Operations

Operator Costs and Project Financial Viability—Under alternative B, there are 78 access-exempt operations and 241 grandfathered operations that would now be subject to 9B regulations in nine park

units because they are located within the boundary of a park unit. These operations account for 60 percent of the current number of operations within park boundaries. However, these exempt operations account for only 4 percent of oil production and 24 percent of natural gas production that is currently occurring within park boundaries. The remainder of the production occurs from currently regulated operations, demonstrating the financial viability of the currently regulated operations (while incurring the associated 9B compliance costs).

The 534 non-federal oil and gas wells are operated by 98 different operators. Of these, only 8 operators do not qualify as small businesses because they employ over 500 people. Small entities operate an average of 5 wells each while large entities operate an average of 18 wells each. The total number of small businesses that may be impacted by this rulemaking is limited to 90 businesses. As described in the “Socioeconomics” section of chapter 3, 90 businesses represent approximately 1 percent of small businesses in the mining and oil and gas sector in the five state area (New Mexico, Ohio, Tennessee, Texas, and West Virginia). Still, the NPS does not discount how these 90 small entities engaged in oil and gas extraction would be affected.

Table 33 in the “Socioeconomics” section in chapter 3 provides average annual receipts (i.e., revenues) and expenses for different sizes of small businesses engaged in the oil and gas extraction industry. The average annual receipts for oil and gas extraction businesses with less than 50 employees are estimated to be about \$15.7 million. On average, the same small businesses in the oil and gas extraction sector incur average annual expenses and investments of approximately \$9.8 million.

Plugging and Reclamation—Removal of the grandfathered and access-exempt operations will create incremental costs in the categories of permitting, meeting NPS operating standards, and obtaining and maintaining performance bonds (covered later in this section). Based on NPS analysis, over 200 of the 241 grandfathered wells are idle or have marginal production, which are primarily located in Big South Fork National River and Recreation Area and Cuyahoga Valley National Park. It is likely that many of these operators would decide to plug and reclaim these wells rather than incur costs to obtain a 9B permit and maintain wells to NPS standards.

Conservatively, it is assumed that 100 of the 241 grandfathered operations would be plugged and reclaimed in the initial year or two following implementation (NPS 2013). Since grandfathered wells lose their grandfathered status once a state permit is obtained for plugging, these operations would be subject to plugging and reclamation costs under the 9B regulations. These 9B compliance costs for plugging and reclamation average approximately \$30,000 per well, and across all 100 wells would cost operators \$3 million. Operators would incur the same costs under alternative A, but the timing of the costs may be accelerated under alternative B. These operator expenditures would temporarily benefit local and regional economies as well-servicing and reclamation companies would support these activities.

The NPS recognizes that those operators who have wells that are producing little or no income may decide to plug and reclaim rather than undertake the expenses necessary to maintain wells to NPS standards. NPS research found that the wells that operators have in units of the national park system typically represent a very small fraction of their total operations in the area. Thus, even though the added expense of the proposed regulation to remove the grandfather exemption may negatively affect individual well economics, it would not be expected to notably affect the business.

Permitting—Operators of access-exempt or grandfathered operations would be required to comply with 9B permitting costs, including gathering and submitting documents describing the mineral rights and associated ownership and interest and site conditions (including disturbed areas and equipment on location). These requirements are estimated to cost operators approximated \$500 per operation, which would be a one-time cost. For the 257 previously access-exempt and grandfathered operations (241

currently grandfathered operations and 20 percent of 78 currently access exempt operations due to assumption that only 20 percent are identified as causing cross-boundary effects and needing regulation), this cost would be approximately \$128,000 across all parks.

Operational Standards—Costs to meet NPS operating standards above and beyond other federal or state regulatory agency’s requirements could include fencing around a facility in a visitor use area, noise mitigation such as engine mufflers or a lubrication schedule for pump jacks, painting, vegetation control, and removal of debris, waste, or other equipment no longer needed in operations. For the remaining grandfathered wells (141 operations), an average of \$2,000 in initial improvements would bring the majority of grandfathered operations up to NPS operating standards (NPS 2013). Maintenance of sites to NPS standards after initial expenditures could add an average of \$500 in annual costs, for a total of \$280,000 in initial costs and \$70,000 in annual costs for the remaining 141 operations.

For the previously access-exempt wells (78 operations), the NPS would initiate regulatory operational controls only where those operations are causing, or could reasonably expect to cause, adverse impacts on federal interests. Based on NPS assessment of well location and proximity to federal property, waters, and topography, it is assumed that 20 percent of the 78 operations, or 16 operations, would warrant NPS regulations to comply with 9B operational requirements, which would result in \$2,000 in initial costs and \$500 in annual costs to maintain operations to standards. For the 16 operations, there would \$32,000 in 9B operational compliance costs in the first year, and \$8,000 annually thereafter.

Operators are expected to benefit from their expenditures in several financial ways due to improved visitor safety and environmental conditions of their sites. First, the way operations are conducted will directly affect the cost of surface reclamation. Improved housekeeping and stronger spill prevention and response would lead to reduced site contamination and lower site remediation costs. Second, improved site security and spill prevention measures reduce liability of the operator due to accidents or vandalism. Finally, because today’s buyers are more aware of safety and environmental liabilities, removing them would increase the market value of the property.

Relative to the all oil and gas production costs, the permitting and operating compliance costs associated with 9B compliance would have small and adverse impacts on operator costs and project viability.

As production declines and margins narrow, operators may choose to plug and reclaim wells rather than incur these recurring 9B operational compliance costs.

Local and Regional Economies—As described above, bringing grandfathered and access-exempt operations under compliance with 9B regulations for permitting and operational standards is expected to have adverse effects on operator costs. These additional expenditures would bring slight benefits to local communities supporting these permitting and operational activities relative to alternative A. Marginally producing wells are assumed to be plugged and reclaimed to avoid these additional compliance costs, although the reduction in production and associated economic benefits to local and regional economies would not be noticeable.

These exempt operations account for only 4 percent of oil production and 24 percent of natural gas production that is currently occurring within park boundaries. As described under alternative A, these exempt operations contribute a small amount of economic benefits relative to the oil and gas activities surrounding the parks. Any small effect on production associated with the exempt wells coming into compliance and previously grandfathered wells being plugged and reclaimed would have no noticeable impacts on local and regional economies. Since only slight production changes are anticipated under alternative B, royalty revenues to leaseholders are not expected to be affected, and impacts would be the same as those described under alternative A.

New Operations

New operations across parks have typically occurred with some degree of access on, across, or through federally owned or controlled lands or waters and therefore have been subject to current 9B regulations. Permitting and operational standards for new wells under the 9B regulations would be the same as those described in alternative A. Since the overwhelming majority of new wells in the past 5 years have been subject to the 9B regulations, it would be very rare for a new operation to be located on private lands that would be subject to the 9B regulations under alternative B when it would not have been subject to these regulations under alternative A. In addition, the decision for exploration and development depends on a number of factors, many of which are beyond the influence of operators and the NPS.

Alternative B is not expected to incrementally change this incentive since most new operations under alternative B would have also been subject to 9B regulations under current conditions. As a result, the same impacts would occur under alternative B as under alternative A, with considerable adverse effects to a few operators because of the increases in costs for new operations associated with 9B compliance costs for permitting and drilling standards. There are limited benefits to local and regional economies associated with the development activities since only 4 wells are assumed to be developed across all of the parks. Impacts on mineral leaseholders would be the same as those described under alternative A, with possible adverse effects on leaseholders associated with difficulties in leasing and relatively smaller bonus bids for leases.

Directional Drilling

As described under alternative A, operators have an incentive to locate their operations outside park boundaries to avoid NPS and other federal requirements, delays in permitting, and costs. With no substantive change to the regulations for directional drilling under alternative B, the incentive for operators to locate their operations outside of park units would remain in place. Impacts on socioeconomic resources would be the same as described under alternative A; project costs for directionally drilled operations would continue to adversely affect operators, although, these costs are lower than they would be if these operations were required to have a plan of operations under the 9B requirements. These development activities would continue to support jobs, income, and tax receipts in local and regional economies.

Financial Assurance

Under alternative B, the existing financial assurance limit that NPS can set per operation would be removed and replaced with a requirement that the amount of financial assurance equals the estimated cost of plugging and reclamation. The NPS would also require operators to submit proof of \$1 million in liability insurance. The NPS reviewed current performance bond amounts compared to actual estimates for plugging and reclamation for applicable sites and has estimated that there are approximately 150 operations with a shortfall in bonding coverage of \$12 million. The bulk of the deficiency in bonding coverage lies with a small number of operators. The annual cost to cover or maintain this surety for the 150 operations is estimated to be \$360,000. It is possible that operators will plug and reclaim marginally producing or idle wells to avoid these bonding costs, and this is likely to occur sooner under alternative B than under alternative A.

There are many other factors influencing the decision to continue production within park boundaries. The compliance cost of additional bonding performance is likely to be a relatively small adverse effect for most operators. Though operator status could change in the future, the NPS evaluated the effect of removing the bonding caps on the currently operating small businesses. Removing the caps could increase

overall industry costs by \$360,000 dollars annually. The analysis found that approximately 1/3 or \$120,000 of the expected \$360,000 dollars would fall to small businesses (NPS 2014).

Removing the bonding cap would affect 10 small entities and 59 of their wells. Analysis indicates that approximately 75 percent of the \$120,000 would go to two small businesses that either operate numerous wells, or operate in an area where plugging and reclamation costs are very high. The other eight small entities would be impacted to a much smaller degree ranging from approximately \$1,800 to \$7,500 per year depending mostly upon how many wells the company operates in a park.

The remaining 80 small businesses conducting operations in parks would have financial assurance requirements that fall below the current \$200,000 cap and thus would not be affected by the rule change.

As noted earlier, the NPS found that operations in parks typically represent a small percentage of an operator's portfolio. Thus, even though the added expense of the proposed regulation to remove bonding caps may negatively affect individual well economics, it would not be expected to notably affect the business.

For new operations, it is expected that 1 in 5 new wells would require performance bonding above and beyond the existing \$200,000 limit currently established (NPS 2014). NPS oil and gas statistics show that the total number of operations has not varied over the years, with new wells being drilled and placed in production at the same rate as old wells are plugged and reclaimed. Therefore, the overall level of performance bonding is not expected to change in the future, so that the estimated annual cost of \$360,000 would include both existing and future operations. Additionally, seismic operations will most likely be unaffected by the bonding limits because reclamation and liability requirements would continue to fall below the current bonding limit of \$200,000 for the foreseeable future (NPS 2014).

Adverse effects on operator costs and project financial viability are not expected to have noticeable impacts on local and regional economies due to the very small contribution that these currently exempt operations have on local and regional oil and gas development and production within adjacent counties and states.

Financial Liability of Operators / Transfer of Interest

Under alternative B, having the previous owner remain liable to the NPS until the new operator complies with the provisions of the regulations and posts adequate financial assurance would ensure that financial assurance is maintained by a responsible party at all times. The previous operator is responsible for notifying the NPS of its transfer of the operation. Since the previous owner would retain reclamation responsibilities until the new owner posts adequate financial assurance, project costs for previous owners could be adversely affected should an incident or spill occur during this period when the new owner has not yet posted financial assurance. No impacts to local and regional economies would occur with the transfer of interest provisions under alternative B.

Enforcement and Penalties

Under alternative B, the new penalty provision that would be established would provide incentives for an operator to comply with the 9B regulations and, in turn, facilitate protection of park resources and values. Operator costs associated with this regulatory provision would only affect operators that allow their operations to fall into a state of noncompliance, fail to respond to informal notification, and/or fail to respond to an official notice of noncompliance. The proposed penalty provisions are expected to motivate noncompliant operators to respond quickly to avoid penalties. Based on park experience, the NPS expects that fines would be incurred only rarely, less than twice a year (NPS 2013). The fines are likely to fall in

the range of one hundred to several hundred dollars. These enforcement penalties would have slight adverse impacts on noncompliant operators and no impacts on local and regional economies when compared to the existing condition.

Compensation for Access across Federally Owned Land

Under alternative B, a fee for privileged access across federal lands outside the boundary of an operator's mineral right would be authorized. An operator's privileged use may be on a road administered by the NPS, new construction of a lease access road, or a combination thereof. Under the no-action alternative, the NPS can charge a registration fee for use of existing park roads, but park compensation for excess surface disturbance within park boundaries but outside the boundary of the mineral right, such as the need to build new road costs or the use of federal land to lay gathering lines outside an operator's mineral right, has not been addressed. The situation where additional compensation would be granted above and beyond the fee for use of existing park roads would occur when construction of a new road or other linear surface disturbance is required.

Analysis of park operations found that 75 operations in 5 parks currently use about 90 acres of surface disturbance (NPS 2014). Although exactly how the compensation would occur for new construction of access roads is not known at this time, these fees are assumed to vary widely depending on the length of the road, the topography, and engineering requirements per operation. NPS analysis based on the BLM and U.S. Forest Service Linear Rights-of-Way Rental Fee Schedule for right-of-way fees on public lands for applicable counties yields a fee of \$67 per acre per year for compensation for access. For 75 operations with surface disturbance of 90 acres, access cost would be \$6,000 annually or an average annual cost of \$80 per operation. As a result, these costs would have little adverse impact on operator costs and no impacts on local and regional economies.

Cost Recovery

Under alternative B, the NPS can collect monies for processing the permit and for the purpose of park maintenance and other improvements within the associated park, including oil and gas permitting and improvements. This provision specifies that any permit fees would come back to the park unit instead of flowing to the general treasury.³ The permit fees would be designed to recover the costs of the NPS permit administration and ongoing monitoring of the operation. As a result, the fees would include both one-time fees as well as a recurring fee to cover the costs of monitoring the site. The one-time fee would vary largely depending on the complexity of the permit, site location, and proximity to sensitive resources (i.e., species habitat, wetlands and water features, cultural resources, etc.). The one-time fee is expected to range from \$500 to \$5,000, depending on the NPS and other federal agency time needed to process the permit. The fees would be expected to adversely affect costs to new operations, although these costs are small relative to the total costs of permitting, drilling and completing wells.

Cumulative Impacts of Alternative B

Under alternative B, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units depending on their effects on jobs, income, visitor spending, and nonmarket environmental values. These are described under alternative A and would be the same under alternative B. Additional federal, state, and local requirements for oil and gas operations above and beyond those required to comply with 9B regulations (e.g., erosion control, water discharge,

³ A policy waiver would be required after the proposed 9B rule is promulgated allowing the fees from these oil and gas permits to move to the relevant park unit.

wildlife, wetlands, floodplain development) increase permitting and operational costs for operators and can also affect project financial viability.

Alternative B would contribute to cumulative impacts from the continued operations of permitted operations, which would have adverse impacts on operator costs and project financial viability, but would not be expected to have notable effects on the businesses as a whole because the cost of regulatory compliance is a very small percentage of average annual receipts and operations in parks are a small percentage of a business' asset portfolio.

When compared to the existing condition, the economic benefits to local and regional communities associated with oil and gas production could be reduced as 100 previously grandfathered wells are plugged and reclaimed. This adverse effect is expected to be slight since plugging and reclamation activities would have slight benefits on local and regional economies through jobs and incomes. The contribution to the cumulative impacts on local and regional economies of alternative B would be slight given the considerable oil and gas development and production occurring in adjacent regions and the many other cumulative impacts, both beneficial and adverse, affecting the local and regional economies.

IMPACTS OF ALTERNATIVE C: MODIFIED PROPOSED RULE

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ.

Previously Exempt Operations

Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations located wholly on non-federally owned lands but still within the boundary of a park unit, that meet the specific exemption criteria of having “no effect on the federal interest.” Because the exemption is “no effect on the federal interest,” the same analysis conducted under alternative B would lead to no operational requirements being attached to the permit. The administrative processes would differ, but the resulting absence of impacts on the federal interest would remain under alternative C. As a result, impacts on costs to operators would be similar as those described for alternative B, although costs to meet permitting requirements, including costs to obtain, gather, and report information, approximately \$500 per well for compliance with 9B requirements, would not apply under alternative C. Permitting and operational costs under alternative C would be expected to have small adverse effects on operator costs and project financial viability and no impacts on local and regional economies.

Directional Drilling

The regulation of directionally drilled wells under alternative C would likely remove a key incentive for operators to locate operations outside of park units. Compliance costs and permitting delays associated with 9B regulations and additional NPS permitting requirements have currently provided a strong incentive for operators to locate operations outside of park boundaries, directionally drilling to access mineral interest below park lands.

According to NPS analysis of surface locations of directionally drilled wells completed under 36 CFR 9.32, 37 percent or 23 operations showed surface logistics that favored a location in the park; that is, operations would have been located within the park boundaries if no NPS regulations existed (O'Dell pers. comm. 2013d). Twenty-two of these operations were in Big Thicket National Preserve, and 1 was located in Aztec Ruins National Monument. Since there would be 9B compliance costs for operations beyond park boundaries that would be incurred under alternative C, there would also be adverse effects on operator costs and project financial viability for operations outside the park boundaries that have

directionally drilled to access minerals under the park boundary. The incremental effect on operator costs per operation is assumed to be the same as those described under alternative B, with adverse effects on operator costs for permitting and meeting operating standards. When these operators move to plug and reclaim these directionally drilled wells, there would be additional plugging and relocation costs associated with the 9B requirements, with an additional \$30,000 incurred per well. Additionally, operators would not have the cost incentive to locate new operations outside of the park boundaries. As a result, there could be many new operations that would have been directionally drilled outside of the park boundary to access mineral resources now choosing to locate these wells within the park boundaries since the 9B compliance costs and delays would be incurred in either location.

Although operators are tied to their leasehold interest underlying federal surface lands, these compliance costs, which would apply to operations whether inside or outside the park boundary, could influence operators to develop new wells within the park boundaries. Operators may also choose to delay development of their lease or mineral interests. Either way, it is possible that mineral leaseholders would have relatively less royalty revenues when compared to the existing condition and alternative B if development were delayed due to the increased compliance costs. Depending on the extent to which development is delayed, which is influenced by many factors, there would be adverse effects on jobs, income, and fiscal receipts from the decreased oil and gas activity in the region. The extent of this effect is uncertain but would be small relative to all of the factors influencing development decisions for operators.

Enforcement and Penalties

Under alternative C, the new joint and several liability provision would create an additional incentive for owners to ensure that their operators comply with the 9B regulations. If an operator becomes non-compliant and non-responsive, the mineral owner(s) would be liable for the operator's compliance with 9B requirements. Similar to alternative B, penalties and costs associated with this provision would only affect operators and owners that allow operations to fall into a state of noncompliance, fail to respond to informal notification, and/or fail to respond to an official notice of noncompliance. Similar to alternative B, these enforcement penalties would have negligible adverse impacts on operator and owner costs, project financial viability, or local and regional economies.

Cumulative Impacts of Alternative C

Cumulative impacts from actions under the cumulative impact scenario would be similar to those described under alternative B. Similar to alternative B, alternative C would contribute to cumulative impacts from the continued operations within park boundaries. Under alternative C, both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario for these park units depending on their effects on jobs, income, visitor spending, nonmarket environmental values, and regulatory requirements. These are described under alternative A and would be the same under alternative C. As in alternative B, alternative C would contribute to cumulative impacts from the continued operations of permitted operations, which would have adverse impacts on operator costs and project financial viability, but would not be expected to have notable effects on the businesses as a whole because the cost of regulatory compliance is a very small percentage of average annual receipts, and operations in parks are a small percentage of a business' asset portfolio.

Compared to the existing condition and alternative B, more new operations are expected to be located within the park boundaries under alternative C, as operators do not have an incentive to locate wells outside the park and directionally drill to access minerals under the park boundaries. As in alternative B, some marginally producing and idle wells are assumed to be plugged and reclaimed under alternative C. Under alternative C, directionally drilled wells would also be subject to 9B requirements, potentially

leading to more marginal or idle wells plugged and abandoned compared to the existing condition and alternative B. Cumulative actions, in combination with alternative C, could add to project costs affecting the viability of marginal and idle wells, resulting in additional plugging and reclamation of wells. Though individual well economics could lead to increased plugging and reclamation costs, these costs for businesses would remain a very small percentage of average annual receipts and profits. Also, many of the regulatory requirements for the siting and operations of the wells are already in effect, and the additional compliance costs associated with 9B requirements under alternative C would have minor cumulative adverse impacts on operators with non-marginal wells.

When compared to the existing condition, the economic benefits to local and regional economies associated with oil and gas production could be reduced as 100 previously grandfathered wells are plugged and reclaimed. This adverse effect is expected to be slight since marginal producing and idle wells are anticipated to be plugged and reclaimed. Plugging and reclamation activities would have slight benefits on local and regional economies through jobs and incomes. Additionally, alternative C, and the 9B compliance costs for operations within park boundaries as well as for those that are directionally drilled, may encourage new operations to be located within park boundaries or could also delay development in the region. When compared to the existing condition and alternative B, this possible reduction in new development could have adverse impacts on local and regional economies. However, the contribution to cumulative impacts of alternative C would be minor given the considerable oil and gas development occurring in the regions and the many other cumulative impacts affecting the local and regional economies.

CONCLUSION

Alternative A

Under the no-action alternative, the current regulations and implementation practices would continue and there would be no change in effects on operator costs and local and regional economies from the existing condition. Implementation of the current 9B regulations on regulated operations is likely having adverse impacts on costs for operations in the seven category 1 park units, while exempt operations do not incur these regulatory costs. The no-action alternative would continue to have adverse effects on operator costs and financial viability for currently regulated operations into the foreseeable future. As wells come to the end of their productive life, additional plugging and reclamation costs would be anticipated to affect four operations per year. Operating costs can become economically significant as production declines and profit margins decrease, and as a result, marginally producing wells may be plugged and reclaimed when regulatory and environmentally sound operating costs exceed revenues. Most new operations would be required to comply with 9B regulations. These additional 9B requirements for permitting and development costs can be notable on a project basis, but remain a fraction of a percentage of average annual revenues. Additionally, plugging and reclamation costs are only anticipated to affect four operations a year across all of the parks. Current 9B regulations and other federal requirements continue to provide incentives for new wells to be directionally drilled from outside park boundaries, and this is expected to continue under the no-action alternative.

Both the regulated and exempt operations are currently benefiting local and regional economies in adjacent communities, although their production is fairly minimal within the local and state context. Additionally, the production supports ad valorem and severance taxes, benefitting communities, counties, and sometimes states, although this is also small within the local and regional context. Financial assurance and financial liability requirements and enforcements and penalties would continue under current conditions, with minimal adverse impacts on most operator costs relative to overall operator costs and no impacts on local and regional economies. Minimal compensation for access across federally owned lands would continue to benefit operator access costs. Because the alternative A would not change

current level of impacts, impacts to communities are generally beneficial, and adverse impacts to operators are generally manageable and minimal, impacts of alternative A would not be significant.

Both adverse and beneficial cumulative impacts would occur from actions considered in the cumulative scenario. However, the contribution to cumulative impacts of the no-action alternative would be slight given the considerable oil and gas development occurring in the regions outside of park boundaries, additional federal, state, and local oil and gas permitting and operational requirements, and the many other cumulative impacts affecting operator costs and local and regional economies. Any adverse cumulative impacts of the alternative would not be significant.

Alternative B

Impacts on socioeconomics from permitted operations would remain the same compared to those described under the existing condition, with additional compliance costs having adverse impacts on operator costs and project financial viability. All operations within the park boundaries would contribute to local and regional economies, although this contribution would not be noticeable. Bringing previously exempt operations under regulation would add some relatively small permitting and operating costs for operators, which would be partially offset by lowered reclamation costs and reduced liability of environmentally sound sites. Again, these additional compliance costs account for only a fraction of an operator's average annual receipts. Removing the bonding cap would increase the administrative costs for a small number of operators and could affect individual well economics. However, the increased bonding expenses are not expected to affect company operations because the expenses account for only a very small percentage of company revenues and profits and the number of wells a company operates in a park is typically a small percentage of its entire business portfolio.

Perhaps up to 100 marginally producing and idle wells are likely to be plugged and reclaimed sooner under alternative B as a result of individual well economics. Since plugging and reclamation costs for grandfathered operations are the same costs as those incurred under alternative A, the impacts associated with plugging and reclaiming 100 marginally producing wells are that these costs are incurred sooner for these operators than experienced under alternative A. Any small effect on production associated with the exempt wells coming into compliance and previously grandfathered wells being plugged and reclaimed would have no noticeable impacts on local and regional economies. Since only slight production changes are anticipated under alternative B, royalty revenues to leaseholders and local and regional economies are not expected to be affected, and impacts would be the same as those described under alternative A.

Similar to alternative A, new operations under alternative B would have an incentive to locate their operations outside park boundaries (directionally drilling wells) to avoid NPS and other federal requirements, delays in permitting, and costs. New operations under alternative B, the same as experienced under alternative A, would result in notable costs on a project basis, but remain a fraction of a percentage of operator revenue and profits. Transfer of interest and financial liability of operators, compensation for federal access, and enforcement and penalties provisions under alternative B would have no to slight adverse impacts on operator costs and no noticeable impact on local and regional economies. Special use permits would allow the NPS to recover fees for processing permits and for park maintenance and other impacts. These fees would be expected to adversely affect costs to new operations, although these costs are small relative to the total costs of permitting, drilling, and completing wells. Because alternative B would result in no noticeable impacts on local and regional economies and any adverse effects on individual operators would be limited in extent, the impacts of this alternative would not be significant.

The additional compliance costs associated with 9B requirements under alternative B would have minor cumulative adverse impacts on operators because of the very small contribution of these 9B operational

costs to operator average annual receipts and the small percentage of a company's portfolio represented by wells in a park unit. The contribution to cumulative impacts of alternative B would be slight given the considerable oil and gas development occurring in the regions and the many other cumulative impacts affecting the local and regional economies, and any adverse impacts of the alternative would not be significant.

Alternative C

Impacts under alternative C would be the same as described for alternative B except for the following areas of regulatory change, where the two action alternatives differ. Under alternative C, the NPS could grant an exemption from the operations permit requirement for operations if operations have "no effect on the federal interest." Impacts on costs to operators would be similar as those described for alternative B, although slightly less, with small adverse effects on operator costs and project financial viability and no impacts on local and regional economies. Alternative C would require directionally drilled operations outside park boundaries to comply with 9B requirements, and adverse effects on compliance costs for these operations would also be incurred under alternative C. The incremental effect on operator costs per operation is assumed to be the same as those described under alternative B, with adverse effects on operator costs for permitting and meeting operating standards. Additionally, operators would not have the cost incentive to locate new operations outside of the park boundaries. As a result, there could be many new operations that would have been directionally drilled outside of the park boundary to access mineral resources now choosing to locate these wells within the park boundaries since the 9B compliance costs and delays would be incurred in either location.

Similar to alternative B, removing the bonding cap under alternative C would increase the administrative costs for a small number of operators and could affect individual well economics. However, the increased bonding expenses are not expected to affect company operations because the costs account for only a very small percentage of operator revenues and profits and the number of wells a company operates in a park is typically a small percentage of its business portfolio.

Under alternative C, the enforcement and penalties provision would be similar to alternative B, although the provision under alternative C would hold mineral owners and operators jointly and severally liable for obligations to comply with permit conditions and the regulations. The proposed penalty provisions are expected to motivate noncompliant operators, as well as mineral owners, to respond quickly to avoid penalties. Similar to alternative B, these enforcement penalties would have negligible adverse impacts on operator and owner costs, project financial viability, or local and regional economies.

Under alternative C, directionally drilled wells would also be subject to 9B requirements, potentially leading to more marginal or idle wells plugged and abandoned. Cumulative actions, in combination with alternative C, could add to project costs affecting the viability of marginal and idle wells, resulting in additional plugging and reclamation of wells compared to alternative B. Because alternative C would result in no noticeable impacts on local and regional economies and any adverse effects on individual operators would be limited in extent, the impacts of this alternative would not be significant.

Many of the regulatory requirements for the siting and operations of the wells are already in effect, and the additional compliance costs associated with 9B requirements under alternative C would have minor cumulative adverse impacts on operators because of the very small contribution of these 9B operational costs. The contribution to cumulative impacts of alternative C would be slight given the considerable oil and gas development occurring in the regions and the many other cumulative impacts affecting the local and regional economies, and any adverse impacts of the alternative would not be significant.

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

NEPA regulations (40 CFR 1502.16) require an EIS to consider the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. Special attention should be given to impacts that narrow the range of beneficial uses of the environment or pose a long-term risk to human health or safety.

Common to All Alternatives with Oil and Gas Well Development. For all alternatives in this plan/EIS, many impacts would be relatively short-term and all impacts on park resources would be mitigated to both preserve and avoid impairment of park resources and values. Land disturbed during oil and gas operations would be reclaimed, equipment and contamination or wastes removed, and the ground restored to its natural contours. However, some surface disturbances resulting from oil and gas development may cause long-term effects, if the areas are not totally reclaimed or are reclaimed after a very long period of time. For example, access roads may be used for more than one well pad or for other multiple uses. In such cases, long-term productivity of soils and vegetation would likely decrease and possibly be lost in the areas used for access roads. Also, in the unlikely case that wetlands cannot be avoided and the mitigation required is not successful in compensating for the original productivity of areas lost, there could be a loss in long-term productivity in these areas. This would be the case if certain out-of-kind wetland mitigation is approved for replacement of productive wetland acreage. Finally, short-term use related to oil and gas development could affect land and water resources and associated wildlife in the longer-term if substantial leaks or spills were to occur and require extended time for cleanup and remediation.

Alternative A: No Action—NPS would not make changes to the non-federal oil and gas regulations. The long-term productivity of park resources could decline in certain areas because of the inability to regulate exempt operations. Habitat degradation would continue due to contamination on sites that are not subject to more stringent cleanup requirements.

Alternative B: Proposed Rule (Preferred Alternative)—Implementation of the new regulations is expected to result in long-term increases in the productivity of park resources since all operations would be subject to more stringent environmental standards. Parks would be able to better manage for vegetation, wildlife, and special-status species and this would increase the productivity of park resources.

Alternative C: Modified Proposed Rule—This would have the similar impacts as alternative B with regard to the benefits of bringing previously exempt operations under regulation. With regard to directionally drilled wells, the overall effect would be adverse compared to the existing condition and alternative B. Long-term benefits to productivity would accrue from the application of more stringent standards to any wells that access minerals under park surfaces. However, this alternative could result in short-term uses of park lands and some loss in park resource productivity because of the potential for more wells to be drilled within park boundaries.

IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

NEPA regulations (40 CFR 1502.16) require an EIS to address the irreversible and irretrievable commitment of resources caused by the alternatives. An *irreversible* commitment of resources is defined as the loss of future options. The term applies primarily to the effects of using nonrenewable resources (such as minerals or cultural resources) or resources that are renewable only over long periods (such as

soil productivity). It could also apply to the loss of an experience as an indirect effect of a “permanent” change in the nature or character of the land. An *irrecoverable* commitment of resources is defined as the loss of production, harvest, or use of natural resources; irrecoverable resource commitments may or may not be irreversible. The following identifies commitments of resources that are either irreversible or irrecoverable.

For all alternatives, there would be an irreversible commitment of the hydrocarbon resources underlying the parks, since oil and gas is being depleted at a much faster rate than it is being formed in the subsurface. Another irreversible commitment of resources would occur if any significant cultural resources were destroyed during any phase of oil and gas development. However, the use of the seismic vibration technique instead of shotholes as the source of seismic waves would reduce the chances of irreversible impacts due to earth disturbance and drilling, although some resources could be lost within the wellbores during well drilling or from vibration impacts. Based on the small size of the wellbores and the historic average of new drilling operations of 4 proposals per year, impacts from well drilling would be relatively minimal. If buried cultural resources cannot be avoided, impacts would be mitigated by the recovery of data (excavation) and preservation of recovered materials and associated records, an irreversible adverse impact. Where seismic vibration is proposed, park staff would identify areas that require subsurface surveying prior to operations commencing to minimize the chances of impact, although unknown resources could be irreversibly affected.

For all alternatives, there would be an irrecoverable loss of undeveloped areas for visitor use and experience where the ground is cleared and disturbed for oil and gas exploration and development, including access roads and well pads. The potential for these lands to produce vegetation or be viewed in an undisturbed state would be irrecoverably committed for the duration of the oil and gas development operations, and until the site(s) have been reclaimed. Changes to rare and unique communities and important foraging and nesting habitat could be considered an irrecoverable resource commitment if construction activities permanently alter the resource such that it can no longer support special-status species or function as a rare and unique community. However, application of the standard of “least damaging” methods for regulated wells and of “imminent threat” for grandfathered operations would prevent irreversible impacts to special-status species.

Because the land used for development of oil and gas wells or other facilities could be converted to another use at a future date if the wells were removed, these effects could be characterized as irrecoverable. However, in some cases, the level of restoration effort needed could be intensive and would not restore sites to previous conditions. Therefore, some of the impacts are likely irreversible. For example, wetland impacts resulting from removal of soils and compaction in areas such as the Everglades may not be reversible even if the fill is removed and the site is revegetated. Restored wetland habitats would have different plant species composition, hydrology, and/or different soil characteristics depending on how restoration was completed.

Alternative A: No Action—NPS would not make changes to the non-federal oil and gas regulations. Continued site degradation and possible contamination at exempt operations would continue in limited locations and could result in irrecoverable losses of wetlands, soils, habitat, and wildlife in the parks.

Alternative B: Proposed Rule (Preferred Alternative)—Implementation of the new regulations is not expected to result in any irrecoverable or irreversible commitments of resources within the parks except for the continued extraction of the mineral resources. Regulation of exempt operations would allow the parks to better manage for resource protection. Directionally drilled wells constructed outside park boundaries would minimize impacts on park resources, but construction of the wells would have similar irrecoverable or irreversible impacts on resources located outside the parks. The type and extent of those impacts would depend on the location of the well pads.

Alternative C: Modified Proposed Rule—This would have the same impacts as alternative B with regard to the effects of having previously exempt operations and also directionally drilled wells come into compliance, and the continued extraction of minerals. However, the potential for more wells to be drilled within park boundaries could result in more construction-related irreversible or irretrievable effects on park resources.

UNAVOIDABLE ADVERSE IMPACTS

Unavoidable adverse impacts are adverse impacts that cannot be avoided and cannot be mitigated, and, therefore, would remain throughout the duration of the oil and gas operation. Under alternatives B and C, the extension of regulation to exempt operations would provide greater protection to park resources and values, thereby avoiding and mitigating potential damage to park resources and values. If an operator's proposal could potentially lead to a significant adverse impact or impairment of park resources, the NPS would not approve the proposed operation until adequate resource protection (mitigation) is integrated into the operation. Also, any variance from NPS requirements or restrictions would need to be approved in a plan of operations, which would provide for avoidance or mitigation of adverse impacts.

For any of the alternatives, there may be unavoidable adverse impacts if the mitigation proposed for any impacted wetlands or water resources is not successful and/or does not compensate for the original wetland functions and values or loss of water-dependent species. However, all alternatives would require avoidance or no net loss of wetlands as the first mitigation measure, as required by NPS policy. In the unlikely case that avoidance or no net loss of wetlands is not possible, it may be difficult to ensure that either the restoration of wetlands required through compensation or the reclamation of the wetlands after operations would have similar functions or values. Water resources would be protected by adherence to regulatory requirements for spill prevention and cleanup, but unexpected releases that breach containment could cause unavoidable adverse impacts until response is initiated and completed.

There may also be unavoidable adverse impacts on visitor uses and experiences, as well as soundscapes and the acoustic environment, if the setbacks and other mitigation measures do not provide enough of a restricted area between oil and gas operations and visitor use areas. There is a possibility that the noise from drilling rigs, compressors, and other oil and gas operations could adversely impact visitor experience, especially on a short-term basis. This would depend on the specific location, intervening topography and vegetation, noise mitigation techniques utilized, and the existing background noise levels in the vicinity of the operation.

Finally, there may be unavoidable adverse impacts related to unplanned releases (blowouts, spills, leaks, and fires). NPS recognizes that unplanned incidents associated with oil and gas operations such as well blowouts, fires, and major spills within the boundaries of parks present a risk of release of contaminants that can adversely impact park resources and values, depending on the location of the release. However, the rate of such incidents is low and if such an incident did occur, required mitigation measures such as use of blowout preventers and implementation of spill prevention, control, and countermeasure plans would be expected to result in lessening the potential for spilled substances or a well fire to spread into the park, and for timely response and cleanup. Therefore, no matter which type of operation is used for drilling and production (conventional or fracturing), there is a reasonable expectation that long term adverse impacts would not occur or be limited in intensity, although there could be substantial short-term adverse effects during the release.

Alternative A: No Action—NPS would not make changes to the non-federal oil and gas regulations. The inability to regulate exempt operations would result in continued adverse effects on park natural and cultural resources in some locations. Adverse impacts could result from well construction inside and outside the park, even those operations under regulation, and would include changes to hydrological

patterns, changes in water quality, soil disturbance, disturbance of wetlands that could not be avoided, changes to natural soundscapes and the acoustic environment due to construction, loss of habitat for wildlife, changes to the visual landscape, and changes in visitor use if the area restricted access.

Alternative B: Proposed Rule (Preferred Alternative)—Implementation of the new regulations would result in no adverse impacts and primarily beneficial impacts. Unavoidable adverse impacts would result from continued operation of permitted wells and construction inside and outside the parks, and include the same effects as described under alternative A.

Alternative C: Modified Proposed Rule—This would have the same impacts as alternative B with regard to the effects of having previously exempt operations and also directionally drilled wells come into compliance, with no adverse effects and primarily beneficial effects. However, the potential for more wells to be drilled within park boundaries could result in unavoidable adverse effects on park resources.

Chapter 5

Consultation and Coordination



CHAPTER 5: CONSULTATION AND COORDINATION

The intent of the National Environmental Policy Act (NEPA) is to encourage the participation of federal and state-involved agencies and affected citizens in the assessment procedure, as appropriate. This section describes the consultation that occurred during development of this Programmatic Plan / Environmental Impact Statement (plan/EIS), including consultation with scientific experts and other agencies. This chapter also includes a description of the public involvement process and a list of the recipients of the draft document.

HISTORY OF PUBLIC INVOLVEMENT

The public involvement activities for this plan/EIS fulfill the requirements of the NEPA and National Park Service (NPS) Director's Order 12 (NPS 2011).

THE SCOPING PROCESS

The NPS divides the scoping process into two parts: internal scoping and external or public scoping. Internal scoping involves discussions among NPS personnel regarding the purpose of and need for management actions, issues, management alternatives, mitigation measures, the analysis boundary, appropriate level of documentation, available references and guidance, and other related topics.

Public scoping is the early involvement of the interested and affected public in the environmental analysis process. The public scoping process helps ensure that people have an opportunity to comment and contribute early in the decision-making process. For this planning document and impact statement, project information was distributed to individuals, agencies, and organizations early in the scoping process, and people were given opportunities to express concerns or views and to identify important issues or even other alternatives.

Taken together, internal and public scoping are essential elements of the NEPA planning process. The following sections describe the various ways scoping was conducted for this impact statement.

INTERNAL SCOPING

Internal scoping for the EIS began in July 2009 with the establishment of an interdisciplinary team comprised of NPS subject matter experts, practitioners, and natural and cultural resource management professionals. Initial interdisciplinary team discussions focused on the purpose and need for action, objectives for taking action, identification of preliminary issues, and development of a public involvement plan. A subsequent team call in July 2011 resulted in the team recommending the inclusion of site-specific analysis for the exempt operations where feasible. The team has continued to meet regularly to provide input to the process, including framing the analysis to focus on main areas of change in the regulations and identifying impact topics for detailed analysis.

PUBLIC SCOPING

Public Notification and Response

Public participation in the scoping process officially began through publication of an Advance Notice of Proposed Rulemaking in the Federal Register (74 FR 61596) on November 25, 2009. The purpose of

issuing the Advance Notice of Proposed Rulemaking was to advise the public of the NPS's intent to develop a proposed rule to revise the 36 CFR 9B regulations, and to seek comments and suggestions related to several topics including: regulation of exempt operations; directional drilling beneath parks from surface locations outside parks; operating standards; operator financial assurance; access fees; and assessments for operator noncompliance with the regulations. The NPS also issued an official News Release on December 22, 2009, advising the public on publication of the Advance Notice of Proposed Rulemaking in the Federal Register. In response to the Advance Notice of Proposed Rulemaking, the NPS received 2,076 letters containing comments from business interests, professional societies, conservation organizations, unaffiliated individuals, and state agencies. The comments received dealt primarily with issues pertaining to areas of exemption from 9B regulations, directional drilling, and general support for the 9B revisions.

On December 30, 2010, the NPS again engaged the public in the scoping process to revise the 36 CFR 9B regulations by publishing a Notice of Intent (NOI) to Prepare an EIS in the Federal Register (75 FR 82362). The NOI specifically solicited public comment on draft purpose and need statements, objectives, and issues and concerns related to revisions of the NPS regulations governing non-federal oil and gas development on units of the national park system. The NOI also requested public comment on possible alternatives the NPS should consider in revising the regulations. In addition, the NOI advised the public that the NPS did not plan to hold public scoping meetings for this draft EIS due to the programmatic, nationwide nature of the regulations and the widely dispersed locations of the 45 parks that could be affected by the revisions. However, the NOI noted that the NPS would decide whether, and if so, where to hold public meetings in conjunction with the release of the draft EIS for public comment depending on the interest generated during the public scoping period.

Comments received during the public scoping period addressed a number of topics. The majority of comments received addressed support for revising the 9B regulations (about 31 percent), identifying areas of exemption from 9B regulations (about 30 percent) and addressing the objectives for taking the proposed action (about 30 percent). The next largest topic addressed during the public scoping period was the presentation of new alternatives or elements, for which about 3 percent of total comments were received.

Comments were received regarding the objectives for taking action. Comments noted that the purpose set forth for the 9B regulations should explicitly state that the regulations are designed to avoid and minimize the adverse effects on fish, wildlife, and associated habitat and to ensure the management of species and habitat within NPS unit boundaries, in addition to other reasons listed. Commenters made suggestions for carefully outlining reclamation objectives in the EIS and called for reclamation plans that include both interim and final plans using defined benchmarks and comparisons to undisturbed reference sites to measure success.

Comments were received that expressed support for revising the current 9B regulations, including several suggestions that "grandfathered" operations should be regulated under the revised rule. One commenter suggested that the revised rule should revoke the exemption for oil and gas operations that are within NPS units but can be reached without crossing federal land or water. Commenters also stated that the current 9B regulations suffer from loopholes that exempt roughly 53 percent of all NPS oil and gas operations from any NPS oversight and that these loopholes should be closed.

Comments were received that presented new alternatives or elements. These included several suggestions for additional standards for oil and gas operators, such as requiring operators to manage their well-sites until the sites have been fully rehabilitated; implementing capture and recapture technologies; prohibiting water withdrawals for shale gas extraction; requiring full disclosure of the identity and volume of all

compounds used in hydraulic fracturing fluids and drilling muds; using improved signage near drilling sites; and avoiding vegetation removal.

AGENCY SCOPING AND CONSULTATION

United States Fish and Wildlife Service

Consultation with the US Fish and Wildlife Service (USFWS) pursuant to Section 7 of the Endangered Species Act (ESA) was initiated in the form of a letter sent at the time the draft EIS was made available for public comment. The letter sought concurrence on the NPS determination that the proposed rule revision may affect but is not likely to adversely affect threatened or endangered species and their associated designated critical habitat. This determination was based upon the assertion that the proposed rule revisions which would entail enhanced protections for natural resources, including ESA-listed species. A response indicating concurrence with the determination of “may affect but is not likely to adversely affect” was received.

State Historic Preservation Offices

Consultation with State Historic Preservation Offices (SHPOs) pursuant to Section 106 of the National Historic Preservation Act of 1966 (NHPA) was conducted for the states containing Category 1 park units identified in this EIS. This consultation was initiated in the form of a letter sent at the time the draft EIS was made available for public comment. The letter stated that the proposed rule is not likely to adversely affect cultural resources due to the fact that the rule change is programmatic in nature, no ground disturbing activities would be authorized by the rule change, and, moreover, the proposed rule change would provide for additional resource protection and mitigation measures, thus resulting in beneficial impacts on cultural resources. The consultation letter explained that future actions will be analyzed separately and will be subject to further site specific consultation and compliance, including section 106, as amended. Responses indicating concurrence with the NPS determination was received.

Tribal Consultation

Tribal consultation letters were sent to each of the 128 tribes traditionally associated with the 42 park units addressed in this draft EIS. Letters provided information to the tribes concerning the proposed action and inquired as to their desire to consult with the NPS. Letters were received from four tribes in response to initial consultation, named in the list of recipients below. Consultation letters and responses are contained in appendix H. Correspondences from tribes included requests for opportunities to provide comment on the draft EIS. Further outreach to tribes occurred during the public review period when the draft EIS/draft rule revision was released.

LIST OF RECIPIENTS OF THE DRAFT RULE REVISION / ENVIRONMENTAL IMPACT STATEMENT

A newsletter describing how to access and comment on the proposed rule and draft EIS was sent to state regulatory agencies, members of Congress, stakeholders, and interested and affected parties. A hard copy of the draft rule revision / draft EIS was sent to the following:

FEDERAL DEPARTMENTS AND AGENCIES

- United States Department of the Interior, Fish and Wildlife Service
- United States Environmental Protection Agency

TRIBAL GOVERNMENTS

- Choctaw Nation of Oklahoma
- Hopi Tribe
- Navajo Nation
- San Carlos Apache Tribe of the San Carlos Reservation, Arizona

STATE HISTORIC PRESERVATION OFFICERS FOR THE FOLLOWING STATES

- Texas, New Mexico, Florida, Tennessee, Kentucky, Ohio, Virginia, West Virginia.

LIST OF PREPARERS AND CONSULTANTS

Name	Title	Responsibilities
National Park Service		
Michael Edwards	Project Manager, Environmental Quality Division	NEPA project manager. Provided input and review; point of contact for project related questions and concerns.
Edward Kassman	Regulatory Specialist, Geologic Resource Division	Regulatory project manager. Provided input and review. Overall lead for the 36 CFR 9B rulemaking revision.
Pat O'Dell	Petroleum Engineer, Geologic Resource Division (former; now with USFWS)	Provided input and review.
Lisa Norby	Chief, Energy and Minerals Branch	Provided input and review.

Name	Title	Responsibilities
The Louis Berger Group, Inc.		
Nancy Van Dyke	Senior Project Manager	Responsible for project management and senior technical review and the visitor use and experience and water resources sections.
Joshua Schnabel	Deputy Project Manager / Environmental Planner	Responsible for project management and the geology and soils and park management and operations sections.
Alynda Foreman	Senior Ecologist	Responsible for the wetlands, floodplains, vegetation, wildlife and special status species sections.
Holly Bender	Senior Economist	Responsible for the socioeconomic section.
Doug Pierson	Senior Planner	Responsible for the natural soundscapes and night skies sections.
Brandon Marette, CWB, PWS	Biologist	Responsible for review of the wildlife and special status species sections.
Rudi Byron, AICP	Environmental Planner	Responsible for the air quality section.
David Plakorus, LEED Green Associate	Planner	Responsible for the scenic views and night sky resources section
Lawrence Earle, AICP	Senior Planner (retired)	Responsible for the cultural resource section
Erin Hudson	Cultural Resources Specialist	Responsible for review of cultural resources comments on second draft
The Final Word		
Juanita Barboa	Technical Editor	Editing
Sherrie Bell	Technical Editor / Document Designer	Editing / Document Design

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GLOSSARY

Abandonment—The termination of oil and gas production operations, removal of facilities, plugging of the well bore, and reclamation of surface disturbances.

Action alternative—An alternative that would involve a change from existing conditions, including changes to established trends or management direction.

Advisory Council on Historic Preservation(ACHP)—The ACHP is an independent federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources, and advises the President and Congress on national historic preservation policy.

Affected environment—Term used in the National Environmental Policy Act to denote surface or subsurface resources (including social and economic elements) within or adjacent to a geographic area that could potentially be affected by a proposed action; the environment of the area to be affected or created by the alternatives under consideration. (40 CFR 1502.15).

Alternative—Combination of management prescriptions applied in specific amounts and locations to achieve desired management goals and objectives.

Aquifer—A water-bearing rock, rock formation, or group of formations. Aquifers can be either unconfined or confined.

Arches—Natural geologic features which bear the properties of an archway, formed through erosion over an extended period of time. Natural arches are particularly sensitive to surface disturbances such as seismic activity which could compromise their strength.

Base floodplain—100-year floodplain.

Best management practices (BMPs)—BMPs are state-of-the-art mitigation measures applied to oil and natural gas drilling and production to help ensure that energy development and operations are conducted in an environmentally responsible manner. BMPs can be simple, such as choosing a paint color that helps oil and gas equipment blend in with the natural surroundings, while others involve cutting-edge monitoring and production technologies.

Biodiversity—The degree of variation of life forms within a given ecosystem, biome, or on an entire planet.

Blowout—An uncontrolled explosion of gas, oil, or other fluids from a drilling well. A blowout occurs when formation pressure exceeds the pressure applied to it by the column of drilling fluid and when blowout prevention equipment is absent or fails.

Blowout preventer (BOP)—One of several valves installed at the wellhead to prevent the escape of pressure either in the annular space between the casing and drill pipe or in open hole (i.e., hole with no drill pipe) during drilling or completion operations.

Bottomhole—The deepest portion of an oil well.

Brine—Water containing relatively large concentrations of dissolved salts, particularly sodium chloride. Brine has higher salt concentrations than ocean water.

Category 1 Park Unit— A park unit within which active non-federal oil and gas development (leasing, exploration, and/or production) is currently occurring.

Category 2 Park Unit— A park unit that is located within or very near an oil and gas resource area (“play”) and near which a high amount of oil and gas development activity is currently occurring.

Cement plug—A balanced plug of cement slurry placed in the wellbore. Cement plugs are used for a variety of applications including hydraulic isolation, provision of a secure platform, and in window-milling operations for sidetracking a new wellbore.

Chimneys—Natural geologic features which bear the properties of a chimney, formed through erosion over an extended period of time. Chimneys are particularly sensitive to surface disturbances such as seismic activity which could compromise their balance.

Code of Federal Regulations (CFR)—A publication that codifies the general and permanent rules and regulations published in the Federal Register by the Executive Branch departments and agencies of the federal government, and which carry the force of law.

Completion—The activities and methods to prepare a well for production. Includes installation of equipment for production from an oil or gas well.

Containerized circulating mud system—A fully containerized, closed-loop drilling fluid system that holds water, drilling mud and well cuttings. Inside a National Park Service unit, an operator must use a closed loop containerized mud system in place of an earthen reserve pit system.

Contaminating substance—Those substances, including but not limited to, saltwater or any other injurious or toxic chemical; waste oil or waste emulsified oil; basic sediment; mud with injurious or toxic substances produced or used in the drilling, development, production, transportation, or on-site storage, refining, and processing of oil and gas.

Cultural landscape—A geographic area, including both cultural and natural resources and the wildlife and domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values.

Cultural resource—Cultural resources include archeological sites; historic sites, buildings, and districts; cultural landscapes; and ethnographic resources.

Director—The Director of the National Park Service.

Directional drilling—Intentional deviation of a wellbore from the vertical (90 degrees). Although wellbores are normally drilled vertically, it is sometimes necessary or advantageous to drill at an angle from the vertical to avoid surface resources.

Drilling fluid (“mud”)—Circulating fluid, one function of which is to lift cuttings out of the wellbore and to the surface. While a mixture of clay, water, and other chemical additives is the most common drilling fluid, wells can also be drilled using oil-based muds, air, or water as the drilling fluid.

Effects—See “impacts.”

Endangered species—Any species which is in danger of extinction throughout all or a significant portion of its range.

Environmental assessment (EA)—A concise public document prepared to provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact. An EA includes a brief discussion of the need for a proposal, the alternatives considered, the environmental impacts of the proposed action and alternatives, and a list of agencies and individuals consulted.

Environmental impact statement (EIS)—A document prepared to analyze the impacts on the environment of a proposed project or action and released to the public for comment and review. EISs are prepared when there is the potential for major impacts on natural, cultural or socioeconomic resources. An EIS must meet the requirements of National Environmental Policy Act, Council on Environmental Quality, and the directives of the agency responsible for the proposed project or action.

Executive orders, memoranda, or proclamations—Regulations having the force of law issued by the President of the United States to the Executive branch of the federal government.

Federal Register—Daily publication of the National Archives and Records Administration that updates the Code of Federal Regulations, in which the public may review the regulations and legal notices issued by federal agencies.

Federally owned and controlled lands—Land that the United States possesses fee title through purchase, donation, public domain, or condemnation. It also includes land that the United States holds any interest, such as a lease, easement, rights-of-way, or cooperative agreement.

Floodplain—The lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, and including at a minimum, that area subject to temporary inundation by a regulatory flood.

Flowlines and gathering lines—Lines or pipelines that transport produced fluids (e.g., oil, gas, brine) from the wellhead to storage, treatment or transportation facilities.

Fracking—See “Hydraulic fracturing”

Gas—Any fluid, either combustible or noncombustible, which is produced in a natural state from the earth, and which maintains a gaseous or rarefied state at ordinary temperature and pressures (36 CFR 9.31(m)).

Geophysical exploration—Geophysical exploration consists primarily of seismic operations and typically involves selective cutting of vegetation along source and receiver lines as needed, use of shotholes/explosives or seismic vibrators as a source of vibration, and recording the data generated from the soundwaves generated in the ground by the source.

Hydraulic fracturing—a well stimulation technique in which fluid is pumped into the formation at high enough pressures and rates to split the rock, forming passages through which oil or gas can flow into the wellbore. Proppants (sand grains, sintered bauxite beads, aluminum pellets, glass beads, or similar materials) are pumped with the fluid to hold the crack open once pumping stops.

Hydrocarbons—Organic compounds consisting of hydrogen and carbon, such as petroleum, crude oil or natural gas, whose densities, boiling points, and freezing points increase as their molecular weights increase. The smallest molecules of hydrocarbons are gaseous; the largest are solids. Petroleum is a mixture of many different hydrocarbons.

Impacts—The likely effects of an action upon specific natural, cultural, or socioeconomic resources. Impacts may be beneficial, or adverse and direct, indirect, and / or cumulative.

Impairment (NPS Policy)—As used in NPS Management Policies, "impairment" means an adverse impact on one or more park resources or values that interferes with the integrity of the park's resources or values, or the opportunities that otherwise would exist for the enjoyment of them, by the present or a future generation. Impairment may occur from visitor activities, NPS activities in managing a park, or activities undertaken by concessioners, contractors, and others operating in a park. As used here, the impairment of park resources and values has the same meaning as the phrase "derogation of the values and purposes for which these various areas have been established," as used in the General Authorities Act.

Impairment (Clean Water Act)—As used in conjunction with the Clean Water Act and associated state water quality programs, a water body is "impaired" if it does not meet one or more of the water quality standards established for it. This places the water body on the "impaired waters list," also known as the "303(d) list" for those pollutants that exceed the water quality standard.

Lease—A legal document executed between a landowner, as lessor, and a company or individual, as lessee, that grants the right to develop the premises for minerals or other products.

Management policies—The *National Park Service Management Policies* set the basic servicewide policy of the National Park Service. They provide the overall foundation, set the framework, and provide direction for management decisions within the National Park Service. The management of the National Park System and National Park Service programs is guided by the U.S. Constitution, public laws, proclamations, executive orders, rules and regulations, and directives of the Secretary of the Interior and the Assistant Secretary for Fish and Wildlife and Parks. Other laws, regulations, and policies related to the administration of federal programs, although not cited, may also apply.

Mitigation—"Mitigation" as defined in the National Environmental Policy Act (40 CFR 1508.20), includes: avoiding the impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action and its Implementation; rectifying the impact of repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; compensating for the impact by replacing or providing substitute resources or environments.

National park system—The total sum of the land and water now and hereafter administered by the Secretary of the Interior through the National Park Service for park, monument, historic, parkway, recreational, or other purposes.

Natural floodplain values—Attributes of floodplains which contribute to ecosystem quality, including soils, vegetation, wildlife habitat, dissipation of flood energy, sedimentation processes, ground water (including riparian ground water) recharge, etc.

Natural gas—Highly compressible, highly expandable mixture of hydrocarbons having a low specific gravity and occurring naturally in a gaseous form. Besides hydrocarbon gases, natural gas may contain appreciable quantities of nitrogen, helium, carbon dioxide, and contaminants.

No-action alternative—An alternative that maintains established trends or management direction. For an oil and gas operation, it typically means that the action as proposed would not occur or current management would continue.

Non-federal oil and gas rights—Rights to oil and gas not owned by the United States where access is on, across, or through federally owned or controlled lands or waters.

Oil—Any viscous, combustible liquid hydrocarbon or solid hydrocarbon substance easily liquefiable on warming, which occurs naturally in the earth, including drip gasoline or other natural condensates recovered from gas without resort to manufacturing processes.

Operations (oil and gas)—“All functions, work and activities within a unit in connection with exploration for and development of oil and gas resources.” (36 CFR 9.31(c)). Operations include, but are not limited to: reconnaissance to gather natural and cultural resources information; line-of-sight surveying and staking; geophysical exploration; exploratory drilling; production, gathering, storage, processing, and transport of petroleum products; inspection, monitoring, and maintenance of equipment; well “work-over” activity; construction, maintenance, and use of pipelines; well plugging and abandonment; reclamation of the surface; and construction or use of roads, or other means of access or transportation, on, across, or through federally owned or controlled lands or waters.

Operator—Person(s) who may have rights to explore and develop non-federally-owned oil and gas in National Park Service units, including: owners: individuals, corporations, local and state governments, and Indian tribes (when the tribe owns the oil and gas in fee); lessees, such as individuals or corporations that lease oil and gas from the owner; and contractors, which are individuals or corporations under contract with the owner, lessee, or operator.

Organic Act—The law that established the National Park Service in 1916.

Permeability—The capacity to transmit fluids or gases through soil or rock materials; the degree of permeability depends upon the size and shape of the pore spaces and interconnections, and the extent of the interconnections.

Physiographic province—A geographic region with a specific geomorphology and often specific subsurface rock type or structural elements.

Plan of operations—Information submitted by an operator describing how proposed oil and gas operations would be conducted in a unit of the National Park System pursuant to the National Park Service's Nonfederal Oil and Gas Rights Regulations, 36 CFR 9B, and containing information requirements pertinent to the type of operations being proposed (36 CFR 9.36(a) through (d)).

Play—An area in which hydrocarbon accumulations or prospects of a given type occur.

Plugging—Permanent closing of a well by removing the completion equipment; pumping cement across producing zones, placing cement plugs at various depths to protect freshwater zones, setting a plug at the surface to cap the well, and removing wellhead equipment.

Practicable—Capable of being done within existing constraints. The test of what is practicable depends upon the situation and includes consideration of the pertinent factors such as environment, cost, or technology.

Prevention of Significant Deterioration—Regulations established to prevent significant deterioration of air quality in areas that already meet National Ambient Air Quality Standards (NAAQS). Specific details of PSD are found in 40 CFR 51.166. Among other provisions, cumulative increases in sulfur dioxide, nitrogen dioxide, and particulate matter (specifically PM₁₀) levels after specified baseline dates must not exceed specified maximum allowable amounts. These allowable increases, also known as increments, are

especially stringent in areas designated as Class I areas (e.g., national parks, wilderness areas) where the preservation of clean air is particularly important. All areas not designated as Class I are currently designated as Class II. Maximum increments in pollutant levels are also given in 40 CFR 51.166 for Class III areas, if any such areas should be so designated by the EPA. Class III increments are less stringent than those for Class I or Class II areas.

Production—Phase of mineral extraction where minerals are made available for treatment and use.

Programmatic—Following a plan, policy, or program.

Public law—A law or statute of the United States.

Reasonably foreseeable development (RFD)—An estimate of the undiscovered hydrocarbon resources in an area and a projection of the type and extent of new operations that could occur to develop these resources.

Reclamation—The process of returning disturbed land to a condition that will be approximately equivalent to the pre-disturbance condition terms of sustained support of functional physical processes, biological productivity, biological organisms, and land uses.

Regional Director—Chief decision-maker in each of the seven regions of the National Park Service.

Regulations—Rules or orders prescribed by federal agencies to regulate conduct, and published in the CFR.

Regulatory floodplain—Specific floodplain which is subject to regulation by Executive Order 11988, “Floodplain Management,” and the National Park Service’s Floodplain Management Guideline (#93-4). For Class I Actions, the Base Floodplain (100-year) is the regulatory floodplain; for Class II Actions, the 500-year return period floodplain is the regulatory floodplain; for Class III Actions, the Extreme floodplain is the regulatory floodplain.

Revegetation—Reestablishment and development of self-sustaining plant cover. On disturbed sites, this normally requires human assistance, such as seedbed preparation, reseeding, and mulching.

Scoping—Scoping is done during the initial phase of project planning to seek input from a variety of sources. This input is used to identify issues, areas requiring additional study, alternative methods and locations, and topics to be analyzed in the National Environmental Policy Act document. Scoping is done internally with National Park Service staff and externally with the interested public, other agencies, and stakeholders.

Section 106—Section 106 of the National Historic Preservation Act of 1966 requires Federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. The historic preservation review process mandated by Section 106 is outlined in regulations issued by the Advisory Council on Historic Preservation.

Seismic surveying (see geophysical exploration)—Reflection seismology (or seismic reflection) is a method of exploration geophysics that uses the principles of seismology to estimate the properties of the Earth's subsurface from reflected seismic waves. The method requires a controlled seismic source of energy, such as dynamite/Tovex, a specialized air gun or a seismic vibrator. By noting the time it takes

for a reflection to arrive at a receiver, it is possible to estimate the depth of the feature that generated the reflection.

Shut-in well—An oil and gas well in which the inlet and outlet valves have been shut off so that it is capable of production but is temporarily not producing.

Split estate—Situation where the mineral estate is owned or controlled by a different party than the owner of the land surface in the same area.

Survey Party—A group of technical experts comprising the field crew tasked with conducting routine measurements and analysis involved in geophysical exploration prior to oil and gas development activities at a particular exploration site or over a wider area.

Taking—In the United States, according to the Fifth Amendment of the Constitution, taking of private real or personal property for public use by the government.

Threatened species—Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

United States Code (USC)—The systematic collection of the existing laws of the United States, organized under 50 separate titles. The citation 16 USC refers to section 1 of title 16.

Vertical drilling—Drilling of a well vertically (90 degrees) to reach a target zone straight underneath the surface location.

Viewshed—An area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point.

Well—A producing well with oil as its primary commercial product. Oil wells almost always produce some gas and frequently produce water. Most oil wells eventually produce mostly gas or water.

Wellbore—The wellbore itself, including the openhole or uncased portion of the well.

Wetlands—Lands that are transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes; 2) the substrate is predominantly undrained hydric soil; and 3) the substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year. (Classification of Wetlands and Deepwater Habitats of the United States by Cowardin et al. 1979).

Wild and Scenic River—A river designated under the National Wild and Scenic Rivers Act (Public Law 90-542; 16 USC. 1271 et seq.) as having outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. Rivers may be designated by Congress or, if certain requirements are met, the Secretary of the Interior. Each river is administered by either a federal or state agency. Designated segments need not include the entire river and may include tributaries.

Workover—Work performed on an existing well to improve, maintain, or restore a well's production. A workover is done using a truck-mounted rig and typically lasts one to several weeks.

Glossary

Workover rig—Specific motorized equipment required to perform a workover operation.

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Appendices



APPENDIX A: TYPES OF NON-FEDERAL OIL AND GAS DEVELOPMENT CONDUCTED IN UNITS OF THE NATIONAL PARK SYSTEM

**Prepared by
Pat O'Dell, Petroleum Engineer
Geologic Resources Division
National Park Service
Denver, Colorado**

INTRODUCTION

The petroleum industry is a continuous cycle of searching for new oil and gas reservoirs, developing and producing them, and finally abandoning the property once the hydrocarbons are depleted.

There are four general phases of petroleum development. The phases are (1) exploration, (2) drilling, (3) production, and (4) abandonment/reclamation. Surface uses vary for each phase in terms of intensity and duration. Also, operations related to one or all of the phases may be occurring in the same area at any given time. In Big South Fork National River and Recreation Area and Obed Wild and Scenic River, most oil and gas activities will likely be part of the production and abandonment/reclamation phases. Drilling is expected to occur on a less frequent basis. Although described below, exploration work such as geophysical surveys is not expected because zones of interest in the area are shallow (economics of seismic survey versus just drilling an explorations well) and there is a good number of wells that provide information for interpreting the subsurface.

To be of interest to the petroleum industry, petroleum deposits must be commercially valuable. There must be a reasonable chance of making a profit on the eventual sale of the oil and gas. Factors such as the market price of oil and gas, the amount of recoverable petroleum, the expected production rates, and the cost of drilling wells, producing, and transporting the product to market all determine the economic viability of developing a deposit once it is discovered.

The following sections are meant to provide the reader with a general understanding of common activities associated with each phase of oil and gas development.

EXPLORATION OPERATIONS

OCCURRENCE OF PETROLEUM

Petroleum deposits are not large underground caverns filled with oil and gas as the term reservoir might suggest. Rather, petroleum accumulates in tiny spaces within the buried rock layers. Most scientists today agree that petroleum was formed from large amounts of very small plant and animal life. These organic materials accumulated in ancient seas, which, over great periods of time, have covered much of the present land area. As time passed, sediments rich in organic matter were buried deeper and deeper. The increased pressure and temperature caused these organic remains to change into oil and natural gas. Once formed, the oil and gas migrated upward until certain forms and shapes of underground rocks halted the upward movement, trapping the hydrocarbons in large quantities. The search for these traps is the focus of the first phase of oil and gas development and exploration.

GEOLOGICAL EXPLORATION

The search for oil and gas often begins with geological exploration. The exploration geologist is looking for clues on the surface that would suggest the possibility of petroleum deposits below. Surface studies comprise the first stage of exploratory fieldwork. Geological surveys of the land surface are made using aerial photographs, satellite photographs, maps of surface outcrops of specific formations or rock types, and geochemical analyses. Field crews map surface attributes and collect surface samples of rock for analysis.

Creating maps of surface outcrops and geochemical analyses requires fieldwork. Little equipment is needed other than surveying gear and rock and soil sampling supplies. These activities require a small field party of two to four persons who can work out of a single vehicle or on foot. Access to remote areas can be gained by a four-wheel-drive vehicle, small all-terrain vehicles, helicopter, pack animals, or by walking. A small boat may be used where navigable water occurs near the area being studied. Constructing roads or channels in shallow water areas is not required at this early stage.

Geochemical analysis often requires subsurface samples to be taken from a ditch or a shallow corehole. The coreholes are usually shallow, but may generate some cuttings.

GEOPHYSICAL EXPLORATION

Geological exploration can narrow the area being searched, but subsurface geology may or may not be accurately indicated by surface outcrops. Geophysical prospecting extends the search beneath the earth's surface. The surveys identify and map characteristics favorable to oil and gas accumulation deep underground. Geophysical operations include gravitational, magnetic, and seismic surveys. Of these, the seismic survey is most common.

Gravitational and Magnetic Surveys—Gravitational and magnetic field studies yield regional or reconnaissance-type data. These surveys detect variation in gravitational attractions and magnetic fields of the various types of rock below the surface.

Gravity surveys are generally done with small, portable instruments called gravity meters or gravimeters. The number and placement of measurement points in a gravity survey depend on the site's characteristics. These include feasibility of access and the spacing pattern necessary to detail the features selected for mapping. The field party required is not large, usually 3 to 6 people. Travel on foot is possible with the smaller portable gravimeters. Progress, however, is slow, so most surveys use four-wheel-drive vehicles. In marshy areas, the use of special swamp or marsh buggies is quite common with gravity survey crews. Airborne survey operations are not yet practical due to present instrument limitations and the relatively large and rapid changes in altitude and acceleration characteristic to aircraft.

The objective of most surveys can be achieved when gravity stations are confined to existing roads or waterways. Where roads or waterways do not exist, a large level of latitude in positioning stations is possible to account for logistical or environmental constraints. Disturbance of the land surface is minimal when established access is already available. Methods of access to roadless areas are similar to those required for geological explorations described above. The surveying technique itself does not require any physical disturbance of the surface.

Magnetic surveys are often used in place of or to supplement gravity surveys. These surveys are done with relatively small airborne or portable ground instruments called magnetometers. Flight patterns usually consist of a series of parallel lines at 1- to 2-mile intervals.

Airborne surveys require geodetic and ground control points. These must be installed on the ground before the survey can take place, if not already present. A majority of the lower 48 states have been surveyed, so these points are already in place. If not, however, the area must be accessed by overland vehicles or helicopters. The size of the field party required is not large. The access to roadless areas is similar to that required for geological exploration described above. The surveying technique itself does not require any physical disturbance of the surface.

Seismic Surveys—Whereas gravity and magnetic surveys provide regional information, seismic survey can provide enough subsurface detail to locate potential oil and gas traps.

A seismic survey gathers subsurface geological information by recording impulses from an artificially generated shock wave. The energy waves travel downward toward underground formations. A series of sensitive instruments, called geophones, set out at surveyed points on the ground, record the energy waves as they are reflected off the subsurface formations and back to the surface. Cables or radio transmitters transfer information from the geophones to a recorder truck that receives and records the reflected seismic energy. Sophisticated computers analyze the data and generate a “picture” of the rocks underground. Each survey line provides a cross-section of the rock formations beneath it, and many lines may be run to create a complete picture.

In remote areas where there is little known subsurface data, a series of short seismic lines may be required to determine the attitude of the subsurface formations. After this, the pattern of seismic lines or grids is designed to make the final data more accurate and valuable. Although alignment is fairly critical, some source and recording stations may be moved or skipped for environmental or logistical reasons without seriously affecting the results of the investigation.

A more recent technique called 3-D Seismic works on the same principle as conventional seismic, but energy and recording stations are placed at a much denser spaced grid. There may be up to 150 energy source locations and 200 recording stations per square mile on a 3-D seismic project. Surveys commonly exceed a 25-square-mile-area. The 3D-Seismic surveys can provide enough detail to locate traps that have been “missed” by conventional geophysical methods and exploratory drilling. Even in areas that have been heavily explored and developed, 3D-Seismic is helping to optimize new field development and find new targets within producing fields. New life is being brought to areas thought to have been played out.

Seismic methods are usually referred to by the various methods of generating the shock wave. These include weight drop, vibrators, dinoseis (combustible gas expansion), and explosives. No matter what method of generating energy is used, the procedures for preparing the line and recording the data are relatively similar. The procedure typically consists of first surveying and flagging the locations for the geophones and the positions of the energy sources. Second, the geophones and the connecting cable are laid down. The cable is either connected with more cable to the recording truck or to a radio transmitter to send the data to the recording truck. Normally the recording truck will be within a short distance of the transmitter or within line of sight. Once the geophones and ground cable are in place, the energy source is put in place. The initiation of the energy source, whether by a “vibroseis” truck or by explosive, is controlled by the recording truck. The shock wave is set off, and the seismic signal recorded by multiple geophones. Once the signal is recorded, the ‘shooting crew travels to the next source point, and the process is repeated.

The most common energy source in seismic work is explosives placed in holes drilled to depths of several feet up to 200 feet. Explosives may range from ½- to 50-pound charges and typically increase in size with increased setting depths. Drills can be mounted on trucks, boats, or specially designed airboats or all-terrain vehicles, depending on the type of access required. In rugged topography, or to reduce surface disturbance associated with access, portable drills are sometimes carried by helicopter or by hand. Other

field equipment can include vehicles to carry water for drilling operations, personnel, surveying equipment, recording equipment, and computers.

Existing roads are used if possible, but reaching some lines may require clearing vegetation and loose rock to improve access for the crews and the trucks. Each mile of seismic line cleared to a width of 8 to 15 feet represents disturbance of about an acre of land. A network of low-standard temporary roads and trails can result from these operations. The alignment of these trails usually consists of straight lines dictated by the grid, often with little regard for steep slopes or rough terrain. Level topography with few trees and shrubs would require little or no trail construction. An area with rugged topography or larger vegetative types such as trees and large shrubs would require more trail preparations. Temporary roads and trails are usually constructed with bulldozers.

Seismic crews consist of several surveying people, people for laying and retrieving the cable and geophones, the truck drivers and drillers for the energy source, personnel in the recording truck and miscellaneous water truck drivers, cleanup people, and field crew managers. The size of the seismic crews varies from 15 to 80 people. On most seismic jobs, the people and equipment are transported in trucks or four-wheel-drive vehicles. However, the surveying, cable laying, and sometimes the drilling can be done on foot in some situations.

Under normal conditions, 3 to 5 miles of line can be surveyed each day using the explosive methods. Crews may be in the field for 1 to 4 weeks for an average conventional survey. An average 3-D survey may take several months to complete.

DRILLING AND PRODUCTION OPERATIONS

OIL AND GAS WELL DRILLING

Classification of Wells—Wells drilled for oil and gas are classified as either exploratory or development wells. An exploratory well is drilled either in search of an as-yet-undiscovered pool of oil or gas (a wildcat well) or to extend greatly the limits of a known pool. Exploratory wells may be classified as (1) wildcat, drilled in an unproven area; (2) field extension or step-out, drilled in an unproven area to extend the proved limits of a field; or (3) deep test, drilled within a field area but to unproven deeper zones. Development wells are wells drilled in proven territory in a field to complete a pattern of production.

Similar to geophysical surveys, drilling operations are relatively short-term. However the intensity of impacts is much higher due to the equipment and materials needed to drill a well and the potential duration of the operation. At a common height of 180 feet, the rig stands as tall as a 12-story building. An average drilling rig needs a level location of about 3 acres. The drilling pad and access road must be capable of supporting thousands of tons of equipment. Existing access roads may need to be widened and upgraded to accommodate heavy loads. Rigs commonly used in Tennessee and Kentucky are somewhat smaller and locations perhaps 1 to 2 acres in size.

Choosing the Site—Once exploration activities have narrowed the search to specific drilling targets, the operator must select an exact spot on the surface to drill the well. The industry prefers to drill vertically, and usually chooses a drill site directly above the desired bottomhole location. When topographical, geological, or environmental constraints prevent a drill site from being located directly above the bottomhole location, the use of direction drilling can achieve the objective. Reaches of over a mile are common for 10,000-foot-deep wells, and extended reach wells have been drilled with over 2 miles of horizontal departure.

Directional drilling involves deviating a wellbore from its vertical along a predetermined course to a target located at some depth and some horizontal distance away. It is a common practice in the industry today, with a number of uses. Directional drilling techniques can be applied if the target zone lies underneath an inaccessible location such as a heavily urbanized area, mountain, or water body, and the drill rig must be located elsewhere. The technique is most often used in offshore applications to allow many wells to be drilled from one location. It can be used to drill around or through fault planes, salt domes, or obstructions in the hole, and to provide relief to a nearby well that has blown out. More recently, the technique has been used to move surface locations as an environmental protection measure.

While directional drilling allows flexibility in the selection of the drill site, there are technical, physical, and economic constraints on its use. Geological factors such as target depths, formation properties (stability, type, dip angle, etc.), and contemplated horizontal departures physically complicate and restrict the opportunities for using directional drilling. Sophisticated equipment and specialized personnel are needed to monitor and guide the direction of the well as it is being drilled. The cost of using this technique typically ranges from 10 percent to 50 percent higher than the cost of a vertical well. While directional drilling can be applied in a wide variety of situations, project specific conditions must always be taken into account.

Accessing the Site—Wildcat drilling often takes place in remote areas. Preliminary exploration work will not have contributed any new roads to an area, although there may be some cross-country trails. Temporary access roads will have to be constructed. Existing roads may need upgrading to accommodate the heavier loads associated with truck traffic. One lane is usually adequate, but turnouts and/or traffic control are necessary to accommodate two-way traffic on longer routes. Installation of culverts or other engineering structures will be needed in steep terrain or when crossing stream channels. Soil texture, topography, and moisture conditions might dictate that roads be surfaced with material such as gravel, oyster shells, caliche, or ground limestone. Heavy equipment such as graders, bulldozers, front-end loaders, and dump trucks are commonly used in constructing roads. In marshy areas, a roadbed may be laid with heavy boards.

Preparing the Drill Site—To accommodate the rig and equipment, the drill site must be prepared. Site preparation may include extensive clearing, grading, cutting, filling, and leveling of the drill pad using heavy construction equipment. Soil material suitable for plant growth is often removed first and stockpiled for later use in reclamation. The operator may also dig reserve pits to hold large volumes of drilling mud and drill cuttings. In environmentally sensitive areas, a large effort is made not to alter the surface area comprising the drill site more than is necessary. For example, reserve pits may not be dug. Instead, large steel bins are placed on the site to receive the cuttings and other materials that are normally dumped into the reserve pits. These bins can then be trucked away from the site and the material inside them disposed of properly. Also, even in areas where reserve pits are excavated, they are often lined with thick plastic sheeting to prevent any contaminated water or other materials from seeping into the ground. The drill pad typically occupies about 2 to 3 acres.

Directional drilling may require a larger-sized rig and additional support facilities that may lead to larger pad sizes. For inland water sites, drilling barges that sit on the bottom may be used as a foundation for the drill rig. Some dredging may be done on these sites to create a slip, and protective skirts or pilings may be installed around the barge to prevent erosion by currents and tidal flow. In deeper water, jack-up, submersible and semi-submersible, rigs and drill ships may be used to drill wildcat wells. An offshore platform is typically used to drill development wells in deep water.

Since a source of freshwater is required for the drilling mud and for other purposes, a water well is sometimes drilled prior to moving the rig onto the location. If other sources are available, the water may be piped or trucked to the site.

At the exact spot on the surface where the hole is to be drilled, a rectangular pit called a cellar is dug, or culvert-like pipe is driven into the ground. If the cellar is dug, it may be lined with boards, or forms may be built and concrete poured to make walls for the cellar. The cellar is needed to accommodate drilling accessories that will be installed under the rig later.

In the middle of the cellar, the top of the well is started, sometimes with a small truck-mounted rig. The conductor hole is large in diameter, perhaps as large as 36 inches or more; is about 20 to 100 feet deep; and is lined with conductor casing, which is also called conductor pipe. If the topsoil is soft, the conductor pipe may be driven into the ground with a pile driver. In either case, the conductor casing keeps the ground near the surface from caving in. Also, it conducts drilling mud back to the surface from the bottom when drilling begins, thus the name conductor pipe.

Usually, another hole considerably smaller in diameter than the conductor hole is dug beside the cellar and also lined with pipe. Called the rathole, it is used as a place to store the kelly when it is temporarily out of the borehole during certain operations. Sometimes on small rigs, a third hole, called the mousehole, is dug. On large rigs, it is not necessary to dig a mousehole because of the rig floor's height above the ground. In either case, the mousehole is lined with pipe and extends upward through the rig floor and is used to hold a joint of pipe ready for makeup.

Rigging Up—With the site prepared, the contractor moves in the rig and related equipment. The process, known as rigging up, begins by centering the base of the rig, called the substructure, over the conductor pipe in the cellar. The substructure supports the derrick or mast, pipe, drawworks, and sometimes the engines. If a mast is used, it is placed into the substructure in a horizontal position and hoisted upright. A standard derrick is assembled piece by piece on the substructure. Meanwhile, other drilling equipment such as the mud pumps are moved into place and readied for drilling.

Other rigging-up operations include erecting stairways, handrails, and guardrails; installing auxiliary equipment to supply electricity, compressed air, and water; and setting up storage facilities and living quarters for the toolpusher and company man. Further, drill pipe, drill collars bits, mud supplies, and many other pieces of equipment and supplies must be brought to the site before the rig can make hole.

Mobilizing the drill rig to the location requires moving 10 to 25 large truckloads of equipment over public highways and smaller roads. In very remote locations, entire drilling crews and service personnel may be temporarily housed onsite. A typical drilling crew consists of five people. Drilling operations are continuous, 24 hours a day and 7 days a week. The crews usually work two 12-hour shifts. With the drilling crew, geologists, engineers, supervisors, and specialized service providers, there may be anywhere from 5 to over 20 people on a drilling location at any given time. An irregular stream of traffic to and from the rig occurs day and night.

Drilling the Surface Hole—Rotary drilling is used almost universally in modern-day drilling. Drilling is accomplished by rotating special bits under pressure. Starting to drill is called “spudding in” the well. To spud in, a large bit, say 17 ½ inches in diameter as an example, is attached to the first drill collar and is lowered into the conductor pipe by adding drill collars and drill pipe one joint at a time until the bit reaches the bottom. While drilling, the rig derrick and associated hoisting equipment support the drill string's weight. The combination of rotary motion and weight on the bit causes rock to be chipped away at the bottom of the hole.

The rotary motion is created by a square or hexagonal rod, called a kelly, which fits through a square or hexagonal hole in a large turntable, called a rotary table. The rotary table sits on the drilling rig floor and as the hole advances, the kelly slides down through it. With the kelly attached to the top joint of pipe, the pump is started to circulate mud, the rotary table is engaged to rotate the drill stem and bit, and weight is

set down on the bit to begin making hole. When the kelly has gone as deep as it can, it is raised, and a joint of drill pipe about 30 feet long is attached in its place. The drill pipe is then lowered, the kelly is attached to the top of it, and drilling recommences. By adding more and more drill pipe, the hole can steadily penetrate deeper.

Large volumes of fluid, generically called drilling mud, circulate down the drill pipe to the drill bit and back to the surface. The mud lubricates and cools the bit and carries drill cuttings to the surface. The composition of the mud system depends on the types of formations being drilled, economics, water availability, pressure, temperature, and many other significant factors. Mud can be as simple as freshwater, or a complex emulsion of water, oil, chemicals, clays, and weighting material. Chemicals added to the mud help drill and protect the hole's integrity. Weighting material is often added to prevent formation fluids from flowing into the well as it is being drilled. Mud systems can be highly toxic or relatively benign. The drilling mud along with cuttings from the well account for the largest volume of waste generated at the well site. In areas around Big South Fork National River and Recreation Area and Obed Wild and Scenic River, wells are often drilled using compressed air instead of drilling mud. Drill cuttings and fluids produced from formations while drilling are blown into a lined pit next to the drilling rig through what is known as a blooey line.

The first part of the hole is known as the surface hole. Even though the formation that contains the hydrocarbons may lie many thousands of feet below this point, drilling ceases temporarily because steps must now be taken to protect and seal off the formations that occur close to the surface. For example, freshwater zones must be protected from contamination by drilling mud. To protect them, special pipe called casing is run into the hole and cemented.

Tripping Out—The first step in running casing is to pull the drill stem and bit out of the hole. Pulling the drill stem and bit out of the hole in order to run casing, change bits, or perform some other operation in the borehole is called tripping out. To trip out, the drilling crew uses the rig's hoisting system, or drawworks, to raise the drill stem out of the hole.

Attached to the traveling block is a set of drill pipe lifting devices called elevators. Elevators are gripping devices that can be latched and unlatched around the tool joints of the drill pipe. The crew latches the elevators around the drill pipe, and the driller raises the traveling block to pull the pipe upward. When the third joint of pipe clears the rotary table, the rotary helpers set the slips and use the tongs to break out the pipe. The pipe is usually removed in stands of three joints. Removing pipe in three-joint stands, rather than in single joints, speeds the tripping out process. With the stand of pipe broken out, the crew guides it into position on the rig floor to the side of the mast or derrick.

The derrickman unlatches the elevators from the top of the pipe and stands the pipe back in the derrick. Working as a close-knit team, the driller, rotary helpers, and derrickman continue tripping out until all the drill pipe, the drill collars, and the bit are out of the hole. At this point, the only thing in the hole is drilling mud, because mud was pumped into the hole while pipe was tripped out.

Running Surface Casing—Once the drill stem is out, often a special casing crew moves in to run the surface casing. Casing is large-diameter steel pipe, and is run into the hole with the use of special heavy-duty casing slips, tongs, and elevators. Casing accessories include centralizers, scratchers, a guide shoe, a float collar, and plugs.

Centralizers keep the casing in the center of the hole so that when the casing is cemented, the cement can be evenly distributed around the outside of the casing. Scratchers help remove mud cake from the side of the hole so that the cement can form a better bond. The guide shoe guides the casing past debris in the hole, and has an opening in its center out of which cement can exit the casing. The float collar serves as a

receptacle for special cementing plugs, and allows drilling mud to enter the casing at a controlled rate. The plugs begin and end the cementing job, and serve to keep cement separated from the mud so that the mud cannot contaminate the cement. The casing crew, with the drilling crew available to help as needed, runs the surface casing into the hole one joint at a time. Casing is available in joints of about 40 feet. Once the hole is lined from bottom to top with casing, the casing is cemented in place.

Cementing—The cementing of oil well casing annuli is a universal practice done for a number of reasons, depending on casing type. Conductor casings can be cemented to prevent the drilling fluid from circulating outside the casing, causing the very surface erosion the casing was intended to prevent. Surface casings must be cemented to seal off and protect freshwater formations, provide an anchor for blowout preventer equipment, and give support at the surface for deeper strings of casing. Intermediate strings of casing are cemented in order to seal off abnormal pressure formations, effectively isolate incompetent formations that might cause drilling problems unless supported by casing and cement, and shut off zones of lost circulation. Production casing is cemented to prevent the migration of fluids to thief zones, to prevent sloughing of formations that could result in reduced production, and to isolate productive zones for future development.

An oilwell cementing service company usually performs the job of cementing the casing in place. The cement used to cement oilwells is not too different from the cement used as a component in ordinary concrete. Basically, oilwell cement is Portland cement with special additives to make it suitable for various conditions of pumping, pressure, and temperature.

Cementing service companies stock various types of cement and use special trucks to transport the cement in bulk to the well site. Bulk cement storage and handling at the rig location make it possible to mix the large quantities needed in a short time. The cementing crew mixes the dry cement with water, often using a recirculating mixer. This device thoroughly mixes the water and cement by recirculating part of the already-mixed components through a mixing compartment. Powerful cementing pumps move the liquid cement (slurry) through a pipe to a special valve made up on the topmost joint of casing. This valve is called a cementing head, or plug container. As the cement slurry arrives, the bottom plug is released from the cementing head and precedes the slurry down the inside of the casing. The bottom plug keeps any mud that is inside the casing from contaminating the cement slurry where the two liquids interface. Also, the plug wipes off mud that adheres to the inside wall of the casing and prevents it from contaminating the cement.

The plug travels ahead of the cement until it reaches the float collar. At the collar the plug stops, but continued pump pressure breaks a seal in the top of the plug and allows the slurry to pass through a passageway in it. The slurry flows out through the guide shoe, and starts up the annulus between the outside of the casing and the wall of the hole until the annulus is filled.

A top plug is released from the cementing head and follows the slurry down the casing. The top plug keeps the displacement fluid, usually drilling mud, from contaminating the cement slurry. When the top plug comes to rest on the bottom plug in the float collar, the pumps are shut down and the slurry is allowed to harden. Allowing time for the cement to set is known as waiting on cement and varies in length. In some cases, it may be only a matter of a few hours; in other cases, it may be 24 hours or even more, depending on well conditions. Adequate waiting on cement time must be given to allow the cement to set properly and bond the casing firmly to the wall of the hole. After the cement hardens and tests indicate that the job is good – that is, that the cement has made a good bond and no voids exist between the casing and the hole – drilling can be resumed.

Tripping In—To resume drilling, the drill stem and a new, smaller bit that fits inside the surface casing must be tripped back into the hole. The bit is made up on the bottommost drill collar. Then, working

together, the driller, floormen, and derrickman make up the stands of drill collars and drill pipe and trip them back into the hole.

When the drill bit reaches bottom, circulation and rotation are begun and the bit drills through the small amount of cement left in the casing, the plugs, the guide shoe, and into the new formation below the cemented casing. As drilling progresses and hole depth increases, formations tend to get harder; as a result, several round trips (trips in and out of the hole) are necessary to replace worn bits.

Controlling Formation Pressure—During all phases of drilling, an important consideration is well control. Well control is preventing the well from blowing out by using proper procedures and equipment. A blowout is the uncontrolled flow of fluids – oil, gas, water, or all three – from a formation that the hole has penetrated.

Blowouts threaten lives, property, and pollution of the environment. Rig crews receive extensive training in how to recognize and react to impending blowouts, making them relatively rare events.

The key to well control is understanding pressure and its effects. Pressure exists in the borehole because it contains drilling mud and in some formations because they contain fluids. All fluids --drilling mud, water, oil, gas, and so forth – exert pressure. The denser the fluid (the more the fluid weighs), the more pressure the fluid exerts. A heavy mud exerts more pressure than a light mud. For effective control of the well, the pressure exerted by the mud in the hole should be higher than the pressure exerted by the fluids in the formation.

Pressure exerted by mud in the hole is called hydrostatic pressure. Pressure exerted by fluids in a formation is called formation pressure. The amount of hydrostatic pressure and formation pressure depends on the depth at which these pressures are measured and the density, or weight, of each fluid. Regardless of the depth, hydrostatic pressure must be equal to or slightly greater than formation pressure, or the well kicks. The well kicks, formation fluids enter the hole, if hydrostatic pressure falls below formation pressure. Thus, one of the crew's main concerns during all phases of the drilling operation is to keep the hole full of mud whose weight is sufficiently high to overcome formation pressure.

However, unexpectedly high formation pressures can be encountered. Formation fluids can be swabbed, or pulled, into the hole by the piston-like action of the bit as pipe is tripped out of the hole. Also, the mud level in the hole can fall so that the hole is no longer full of mud. Whatever the reason, when hydrostatic pressure falls below formation pressure, crew members have a kick on their hands, and they must take quick and proper action to prevent the kick from becoming a blowout.

Helping the crew keep an eye on the rig's operation are various control instruments located on the driller's console. Some rigs have data processing systems that utilize slave computer display terminals, or CRTs (short for cathode ray tubes), on the rig floor, in the mud logging trailer, in the toolpusher's trailer, and in the company man's trailer. When limits that have been programmed into the system are exceeded, the system goes into an alarm condition.

Whether the kick warning signs come from electronic monitors, a computer printout, or the behavior of the mud returning from the hole, an alert drilling crew detects the signs and takes proper action to shut the well in. To shut a well in, large valves called blowout preventers, which are installed on top of the cemented casing, are closed to prevent further entry of formation fluids into the hole. Once the well is shut in, procedures are begun to circulate the intruded kick fluids out of the hole. Also, weighting material is added to the mud to increase its density to the proper amount to prevent further kicks, and the weighted up mud is circulated into the hole. If the mud has been weighted the proper amount, then normal operations can be resumed.

When drilling with air, there is very little hydrostatic pressure exerted downhole, and formations are drilled through in an “underbalanced” mode. This means the formations can flow into the wellbore as drilling progresses. With air drilling, well control is more dependent on the blowout preventers. It is prudent and often a regulatory requirement to have 1) extra storage capacity to hold formation fluids and 2) materials and equipment on location to “mud up” if necessary to maintain well control and wellbore integrity.

Running and Cementing Intermediate Casing—At a predetermined depth, drilling stops again in order to run another string of casing. Depending on the depth of the hydrocarbon reservoir, this string of casing may be the final one, or it may be an intermediate one. Intermediate casing is smaller than surface casing because it must be run inside the surface string and to the bottom of the intermediate hole. In general, it is run and cemented in much the same way as surface casing.

Final Depth and Well Evaluation—Using a still smaller bit that fits inside the intermediate casing, the next part of the hole is drilled. Often, the next part of the hole is the final part of the hole unless more than one intermediate string is required. After cementing the intermediate casing, drilling resumes by tripping the new bit and drill stem back in the hole. The intermediate casing shoe is drilled out, and drilling the new hole resumes.

While drilling and once reaching the total depth of the well, the operator collects information to determine if hydrocarbons have been encountered. To help the operator decide whether to abandon the well or to set a final, or production, string of casing, several techniques can be used. A thorough examination of the cuttings made indicates whether the formation contains sufficient hydrocarbons. A geologist catches cuttings at the shale shaker and analyzes them in a portable laboratory at the well site. He often works closely with a mud logger logger – a technician who monitors and records information brought to the surface by the drilling mud as the hole penetrates formations of interest.

Well logging is another valuable method of analyzing downhole formations. Using a mobile laboratory, well loggers lower sensitive tools to the bottom of the well on wireline and then pull them back up the hole. As they pass back up the hole, the tools measure and record certain properties of the formations and the fluids (oil, gas, and water) that may reside in the formations. Logging tools can also be run as part of the drill string to measure hole conditions and formation properties as the well is being drilled. This is called “measurement while drilling.”

If logging results indicate commercial quantities, a drill stem test may be run. Tools are positioned on the drill pipe to isolate the zone to be flow tested. Downhole formation pressure and fluids enter the tool and activate a recorder. Test may be designed to allow formation fluids to flow to the surface during the test or just to allow a certain volume to enter into the wellbore. In either case, provisions must be made at the surface to separate formation fluids from the mud, and to store and dispose of formation liquids. Natural gas produced during drill stem test is vented or flared. A properly designed and run drill stem test can give excellent indication of the types and volumes of fluid the zone is capable of producing.

In addition to well logging and drill stem testing, formation core samples can be taken from the hole and examined in a laboratory.

Setting Production Casing—After the drilling contractor has drilled the hole to final depth and the operating company has evaluated the formations, the company decides whether to set production casing or plug and abandon the well. If the well is judged to be a dry hole --that is, not capable of producing oil or gas in commercial quantities – the well will be plugged and abandoned.

Several cement plugs will be put in the well to seal it permanently. Cement plugs will be designed and placed to protect the zones of usable water from pollution and to prevent escape of oil, gas, or other fluids to the surface or other zones. Plugging and abandoning a well is considerably less expensive than completing it.

On the other hand, if evaluation reveals that commercial amounts of hydrocarbons exist, the company may decide to set casing and complete the well. The services of a casing crew and cementing company will once more be arranged for; and the production casing will be run and cemented in the well.

The drilling contractor nears the end of his job when the hole has been drilled to total depth and production casing has been set and cemented. In some cases, the rig and crew remain on the location to “complete” the well, or make it ready for production. In other cases, the drilling contractor moves his rig, and the operator brings in a smaller, less expensive completion rig and crew to finish up the job.

Well Completion—Completion equipment and methods employed are quite varied. The perforated completion is by far the most popular method of completing a well. Perforating is the process of piercing the casing wall, cement, and rock to provide openings through which formation fluids may enter the wellbore. Perforating is accomplished by placing guns holding special explosive charges opposite the zone to be produced. The charges are shaped so that an intense, directional explosion is formed. The well must have a good cement job and well-designed and well-executed perforation methods to get effective formation flow.

Explosives used in perforating guns are very stable. Accidents are rare as long as the people involved use proper procedures. Perforating guns may be run in the well on tubing or by wireline. Firing is accomplished by applying electric current, pressure, or mechanical force to a firing head located on the perforating gun.

In some areas, formations are competent enough that production casing is not used. The drilled hole is left uncased. Many wells in Tennessee and Kentucky are constructed with only surface casing and open hole below.

The final string of pipe usually run in a producing well is the tubing. Tubing is a string of relatively small diameter pipe through which the hydrocarbons are produced. Tubing sizes vary from less than 2 inches in diameter up to 4½ inches for large volume producers. In a flowing well, its smaller diameter produces more efficient flow than casing. Also, since it is not cemented in the hole, tubing may be removed when it becomes plugged or damaged. Tubing, when used with a packer, keeps well fluids and formation pressures away from the casing. Well fluids and high pressures can damage casing, necessitating costly repairs.

The packer consists of a pipe like device through which well fluids can flow. Rubber sealing elements form a fluid tight seal around the inside of the casing. Gripping elements, called slips, hold the packer in place. Because the packer seals off the space between the tubing and the casing, produced fluids are forced into and up the tubing.

Another device often installed in the tubing string near the surface is a “subsurface safety valve.” The valve remains opened, as long a flow is normal. When the valve senses a loss in pressure or significantly increased flow (such as would occur with a flowline break), the valve closes automatically. Subsurface safety valves can prevent uncontrolled well flow in the event of massive surface equipment failure.

Finally, a tubing head is installed at the top of the well to support the tubing. Valves, gauges, and flow control devices are installed on top of the tubing head. Together, they make up what is commonly called a Christmas tree.

When reservoir pressures are not sufficient for the well to flow on its own, operators employ artificial lift methods. The most common by far is rod pumping. A plunger pump is installed deep in the well and connected by rods to a pumping unit on the surface. The pump jack moves the rods up and down to work the downhole pump. Pump jacks are often driven with electric motors or natural gas engines. The gas lift method works by injecting high-pressure gas into the fluid column of a well to lighten and raise the fluid by expansion of the gas. Instead of pump jacks, there will be a source of high-pressure gas in the field, usually from a gas compressor. The hydraulic pumping method uses a fluid to drive a downhole motor, which in turn drives a pump that pumps the oil to the surface. Surface equipment for hydraulic pumping includes a high-pressure pump and vessels to separate the hydraulic fluid from produced fluid. Yet another type of artificial lift is electric submersible pumping, usually only used on very high-volume wells. An electric motor attached to a pump is installed downhole. Electric current is supplied to the motor through special heavy-duty armored cable. Surface facilities may just be a small transformer/control box.

The well may be stimulated to enhance flow. Stimulation may be performed before or after the completion equipment is installed. Two common types of stimulation are formation acidization and hydraulic fracturing. Stimulation treatments can improve flow to the point where commercial production is achieved in an otherwise uneconomical well.

Formation acidizing is treating the hydrocarbon-bearing rock with large volumes of acid. The most common types of acid used are hydrochloric (HCl) and hydrofluoric (HF). Oilfield acids contain additives to prevent or delay corrosion of the well's tubulars, inhibit sludging and emulsion reactions with oil in the formation, and make the acid easier to pump. The aim in acidizing is to enlarge the pore spaces and passages by dissolving rock, thus enlarging existing flow channels and opening new ones to the wellbore.

Acid is brought to the well location in tanker trucks and pumped using one or more truck-mounted pumps. Spent acid that is flowed back from the well is often kept separate from field production. The spent acid may be put into temporary tanks until it is trucked off to disposal.

In hydraulic fracturing, fluid is pumped into the formation at high enough pressures and rates to split the rock. Proppants are pumped with the fluid to hold the crack open once pumping stops. Sand and sintered bauxite beads are two common propping agents. Fracturing fluid must not only break down the formation, but also extend and transport the proppant into the fracture. The industry has developed a multitude of complex fluid and proppant systems to achieve the best results in the many varied types of reservoirs.

Many truck-mounted pumps and temporary storage tanks are needed on location to fracture-treat wells. Larger well locations may be needed if hydraulic fracturing is part of a completion procedure.

Field Development—If the wildcat well produces oil or gas in commercial quantities, one or more additional wells are normally drilled to confirm the initial finding and further test and define the extent of the oil or gas reserves. Location of the confirmation wells is dependent upon analysis of discovery well data and any existing seismic surveys. Confirmation progresses by drilling one well after another, each dependent on the results of the previous wells.

With more information in hand, facilities can be designed to handle production from the field. Next, development wells are drilled as needed to efficiently drain the reservoir. The procedures for drilling development wells are about the same as for wildcats, except that there may be a variation in the amount

and type of subsurface sampling, testing, and evaluation. More detailed seismic work may be performed to aid in the location of development wells.

A state Oil & Gas Commission usually establishes the field well spacing pattern. Typical well spacing may be one well every 640, 320, 160, 80, or 40 acres. Completely filled spacing patterns would translate to 1, 2, 4, 8, or 16 wells per square mile, respectively. In general, oil well spacing is denser for oil wells than for gas wells, and shallow well spacing is denser than for deeper wells.

Access roads to development wells are usually better planned and constructed than those for wildcat wells because these wells are expected to have longer lives. Typically a lease area will have one main route, with side roads to each well or multi-well pad location. Change from temporary to permanent roads does not take place until a well has been established as being capable of production. The amount of roadway required per square mile of field is 4 miles, based upon a spacing pattern of 40 acres and a separate pad for each well.

Directional drilling is sometimes used to concentrate the surface locations of two or more wells in one area. This technique minimizes the amount of surface area (roads and well pads) needed to develop a field. Multiple well pads may be used when developing a field inside the limits of a city or in environmentally sensitive areas.

Other surface equipment and support facilities are brought in or constructed during field development. For example, a battery of storage tanks or a pipeline may be required to handle produced oil or gas. Separation and treatment facilities are required to separate gas and water from oil. Storage tanks are required to hold brines produced during oil extraction, and a proper disposal capability, most typically reinjection, must be developed. Natural gas must be properly disposed of (usually flared) or treated to remove impurities if it is to be used or sold.

Well Servicing and Workover Operations—Sometimes it is necessary to repair downhole mechanical problems. Workover rigs are often used to repair downhole equipment or assist in large stimulation jobs. The most common well servicing operation is related to artificial lift installation, tubing string repairs, and work on other downhole completion equipment that may be malfunctioning. More involved workover operations might include cleanout of sand, scale, or paraffin deposits that accumulate in the well, casing repair, cementing, perforating new or existing zones of production, or even some limited drilling operations.

Workover rigs are scaled-down drilling rigs. They are usually equipped to stand the pipe in the derrick, rotate pipe while it is in the hole, and circulate workover fluids down and back up the well. Workover rigs are usually self-contained on a truck. They are highly mobile and can be rigged up and rigged down quickly. A well servicing job to replace a rod pump may last only 1 or 2 days. A major workover operation to change or “recomplete” to another productive zone may last more than a month.

PLUGGING/ABANDONMENT/RECLAMATION

Workover rigs are also used to plug and abandon wells once they are depleted. Plugging operations consist of removing the tubing, packer, and other completion equipment; pumping cement across producing zones; and placing cement plugs at various depths to protect freshwater zones. Finally, a cement plug is set at the surface to cap the well, and wellhead equipment is cut off. A permanent abandonment marker is often placed to identify the well’s location.

The surface owner and regulatory agencies often dictate surface reclamation. Reclamation can range from just removing equipment to reclaiming the area to conditions that existed before drilling the well.

Full-scale reclamation can include the following:

- Removal of structures, equipment, and debris used or generated during operations;
- Removal or remediation of contaminated soils;
- Recontouring of disturbed areas to near original grade;
- Spreading and preparation of topsoil;
- Planting of native vegetation, usually grasses, but sometimes also tree saplings;
- Erosion protection measures such as mulching; and
- Monitoring of revegetation and erosion control efforts.

Reclamation may last a few days or a few years, depending on the degree of contamination on the site and the ability of native species to grow.

APPENDIX B: 9B REGULATIONS

36 CFR PART 9 SUBPART – B NON-FEDERAL OIL AND GAS RIGHTS REGULATIONS

AUTHORITY: Act of August 25, 1916, 39 Stat. 535 (16 USC 1, et seq.); and the acts establishing the units of the National Park System, including but not limited to: Act of April 25, 1947, 61 Stat. 54 (16 USC 241, et seq.); Act of July 2, 1958, 72 Stat. 285 (16 USC 410, et seq.); Act of October 27, 1972, 86 Stat. 1312 (16 USC 460dd, et seq.); Act of October 11, 1974, 88 Stat. 1256 (16 USC 698 – 698e); Act of October 11, 1974, 88 Stat. 1258 (16 USC 698f – 698m); Act of December 27, 1974, 88 Stat. 1787 (16 USC 460ff et seq.).

SOURCE: 43 FR 57825, Dec. 8, 1978, unless otherwise noted.

§ 9.30 Purpose and scope.

(a) These regulations control all activities within any unit of the National Park System in the exercise of rights to oil and gas not owned by the United States where access is on, across or through federally owned or controlled lands or waters. Such rights arise most frequently in one of two situations: (1) When the land is owned in fee, including the right to the oil and gas, or (2) When in a transfer of the surface estate to the United States, the grantor reserved the rights to the oil and gas. These regulations are designed to insure that activities undertaken pursuant to these rights are conducted in a manner consistent with the purposes for which the National Park System and each unit thereof were created, to prevent or minimize damage to the environment and other resource values, and to insure to the extent feasible that all units of the National Park System are left unimpaired for the enjoyment of future generations.

These regulations are not intended to result in the taking of a property interest, but rather to impose reasonable regulations on activities which involve and affect federally-owned lands.

(b) Regulations controlling the exercise of minerals rights obtained under the Mining Law of 1872 in units of the National Park System can be found at 36 C.F.R. Part 9, Subpart A. In area where oil and gas are owned by the United States, and leasing is authorized, the applicable regulations can be found at 43 C.F.R., Group 3100.

(c) These regulations allow operators the flexibility to design plans of operations only for that phase of operations contemplated. Each plan need only describe those functions for which the operator wants immediate approval. For instance, it is impossible to define, at the beginning of exploratory activity, the design that production facilities might take. For this reason, an operator may submit a plan which applies only to the exploratory phase, allowing careful preparation of a plan for the production phase after exploration is completed. This allows for phased reclamation and bonding at a level commensurate with the level of operations approved. However, it must be noted that because of potential cumulative impacts, and because of qualitative differences in the nature of the operations, approval of a plan of operations covering one phase of operations does not guarantee later approval of a plan of operations covering a subsequent phase.

[43 FR 57825, Dec. 8, 1978, as amended at 44 FR 37914, June 29, 1979]

§9.31 Definitions.

The terms used in this Subpart shall have the following meanings:

- (a) Secretary. The Secretary of the Interior.
- (b) Director. The Director of the National Park Service or his designee.
- (c) Operations. All functions, work and activities within a unit in connection with exploration for and development of oil and gas resources, the right to which is not owned by the United States, including: gathering basic information required to comply with this subpart, prospecting, exploration, surveying, preproduction development and production; gathering, onsite storage, transport or processing of petroleum products; surveillance, inspection, monitoring, or maintenance of equipment; reclamation of the surface disturbed by such activities; and all activities and uses reasonably incident thereto performed within a unit, including construction or use of roads, pipelines, or other means of access or transportation on, across, or through federally owned or controlled lands and waters, regardless of whether such activities and uses take place on Federal, State or private lands.
- (d) Operator. A person conducting or proposing to conduct operations.
- (e) Person. Any individual, firm, partnership, corporation, association, or other entity.
- (f) Superintendent. The Superintendent, or his designee, of the unit of the National Park System containing lands subject to the rights covered by these regulations.
- (g) Commercial Vehicle. Any motorized equipment used in direct or indirect support of operations.
- (h) Unit. Any National Park System area.
- (i) Owner. The owner, or his legal representative, of the rights to oil and gas being exercised.
- (j) Designated Roads. Those existing roads determined by the Superintendent in accordance with 36 C.F.R. 1.5 and § 4.19 to be open for the use of the general public or for the exclusive use of an operator.
- (k) Oil. Any viscous combustible liquid hydrocarbon or solid hydrocarbon substance easily liquifiable on warming which occurs naturally in the earth, including drip gasoline or other natural condensates recovered from gas without resort to manufacturing process.
- (l) Gas. Any fluid, either combustible or noncombustible, which is produced in a natural state from the earth and which maintains a gaseous or rarefied state at ordinary temperature and pressure conditions.
- (m) Site. Those lands or waters on which operations are to be carried out.
- (n) Contaminating substances. Those substances, including but not limited to, salt water or any other injurious or toxic chemical, waste oil or waste emulsified oil, basic sediment, mud with injurious or toxic additives, or injurious or toxic substances produced or used in the drilling, development, production, transportation, or on-site storage, refining, and processing of oil and gas.
- (o) Statement for Management. A National Park Service planning document used to guide short- and long-term management of a unit; to determine the nature and extent of planning required to meet the unit's

management objectives; and, in the absence of more specific planning documents, to provide a general framework for directing park operations and communicating park objectives to the public.

[43 F R 57825, Dec. 8, 1978: 44 FR 37914, June 29, 1979, as amended at 60 FR 55791, Nov. 3 1995; 62 FR 30234, June 3, 1997]

§ 9.32 Access.

(a) No access on, across or through lands or waters owned or controlled by the United States to a site for operations will be granted except for operations covered by § 9.33 and, except as provided by § 9.38, until the operator has filed a plan of operations pursuant to § 9.36 and has had the plan of operations approved in accordance with § 9.37. An approved plan of operations serves as the operator's access permit.

(b) No operations shall be conducted on a site within a unit, access to which is on, across or through federally owned or controlled lands or waters except in accordance with an approved plan of operations, the terms of § 9.33 or approval under § 9.38.

(c) Any operator intending to use aircraft of any kind for access to a federally-owned or controlled site must comply with these regulations. Failure of an operator to receive the proper approval under these regulations prior to using aircraft in this manner is a violation of both these regulations and 36 C.F.R. 2.17.

(d) No access to a site outside a unit will be permitted across unit lands unless such access is by foot, pack animal, or designated road. Persons using designated roads for access to such a site must comply with the terms of § 9.50 where applicable.

(e) Any operator on a site outside the boundaries of a unit must comply with these regulations if he is using directional drilling techniques which result in the drill hole crossing into the unit and passing under any land or water the surface of which is owned by the United States. Except, that the operator need not comply in those areas where, upon application of the operator or upon his own action, the Regional Director is able to determine from available data, that such operations pose no significant threat of damage to park resources, both surface and subsurface, resulting from surface subsidence, fracture of geological formations with resultant fresh water aquifer contamination, or natural gas escape, or the like.

§ 9.33 Existing operations.

(a) Any person conducting operations on January 8, 1979 in accordance with a Federal or State issued permit may continue to do so as provided by this section. After expiration of such existing permits no operations shall be conducted except under an approved plan of operations, unless access is granted by the Regional Director under § 9.38.

(1) All Federal special use permits dealing with access on, across or through lands or waters owned or controlled by the United States to a site for the conduct of operations within any unit issued prior to January 8, 1979 shall expire according to their terms and shall not be renewed, unless by the terms of the existing permit it must be renewed.

(2) All operations on a site in a unit access to which is on, across, or through federally owned or controlled lands or waters conducted pursuant to a valid State access permit may be continued for the term of that permit, exclusive of any renewal period whether mandatory or discretionary, if conducted in accordance with the permit.

(b) Any person conducting operations on January 8, 1979 in a unit where Federal or State permits were not required prior to January 8, 1979 may continue those operations pending a final decision on his plan of operations; Provided, That:

(1) The operator (within thirty (30) days of January 8, 1979), notifies the Superintendent in writing of the nature and location of the operations; and

(2) Within sixty (60) days after such notification, the operator submits, in accordance with these regulations, a substantially complete proposed plan of operations for those operations;

(3) Failure to comply with § 9.33(b) (1) and (2) shall constitute grounds for the suspension of operations.

(c) At any time when operations which are allowed to continue under § 9.33 (a) and (b) pose an immediate threat of significant injury to federally owned or controlled lands or waters, the Superintendent shall require the operator to suspend operations immediately until the threat is removed or remedied. The Superintendent must, within five (5) days of this suspension notify the operator in writing of the reasons for the suspension and of his right to appeal the suspension under § 9.49.

[43 FR 57825, Dec. 8, 1978; 44 FR 37914, June 29, 1979]

§ 9.34 Transfers of interest.

(a) Whenever an owner of rights being exercised under an approved plan of operations sells, assigns, bequeaths, or otherwise conveys all or any part of those rights, he, his agent, executor, or representative must notify the Superintendent within sixty (60) days of the transfer of: the site(s) involved; the name and address of the person to whom an interest has been conveyed; and a description of the interest transferred. Failure to so notify the Superintendent shall render the approval of any previously approved plan of operations void.

(b) The transferring owner shall remain responsible for compliance with the plan of operations and shall remain liable under his bond until such time as the Superintendent is notified of the transfer in accordance with paragraph (a). At that time the Superintendent will prohibit the new owner from operating until such time as the new owner has filed with the Superintendent: (1) A statement ratifying the existing plan of operations and stating his intent to be bound thereby, or a new plan of operations, and (2) a suitable substitute performance bond which complies with the requirements of § 9.48.

§ 9.35 Use of water.

No operator may use for operations any water from a point of diversion which is within the boundaries of any unit unless authorized in writing by the Regional Director. The Regional Director shall not approve a plan of operations requiring the use of water from such source unless the operator shows either that his right to the use of the water is superior to any claim of the United States to the water, or where the operator's claim to the water is subordinate to that of the United States that the removal of the water from the water system will not damage the unit's resources. In either situation, the operator's use of water must comply with appropriate State water laws.

§ 9.36 Plan of operations.

(a) The proposed plan of operations shall include, as appropriate to the proposed operations, the following:

(1) The names and legal addresses of the following persons: The operator and the owner(s) or lessee(s) (if rights are State-owned) other than the operator;

(2) Copy of the lease, deed, designation of operator, or assignment of rights upon which the operator's right to conduct operations is based;

(3) A map or maps showing the location of the perimeter of the area where the operator has the right to conduct operations, as described in § 9.36(a)(2), referenced to the State plane coordinate system or other public land survey as acceptable to the Superintendent;

(4) A map or maps showing the location, as determined by a registered land surveyor or civil engineer, of a point within a site of operations showing its relationship to the perimeter of the area described in § 9.36(a)(2) and to the perimeter of the site of operations; the location of existing and proposed access roads or routes to the site; the boundaries of proposed surface disturbance; the location of proposed drilling; location and description of all surface facilities including sumps, reserve pits and ponds; location of tank batteries, production facilities and gathering, service and transmission lines; wellsite layout; sources of construction materials such as fill; and the location of ancillary facilities such as camps, sanitary facilities, water supply and disposal facilities, and airstrips. The point within the site of operations identified by registered land surveyor or civil engineer shall be marked with a permanent ground monument acceptable to the Superintendent, shall contain the point's State plane coordinate values, and shall be placed at least to an accuracy of third order, class I, unless otherwise authorized by the Superintendent;

(5) A description of the major equipment to be used in the operations, including a description of equipment and methods to be used for the transport of all waters used in or produced by operations, and of the proposed method of transporting such equipment to and from the site;

(6) An estimated timetable for any phase of operations for which approval is sought and the anticipated date of operation completion;

(7) The geologic name of the surface formation;

(8) The proposed drilling depth, and the estimated tops of important geologic markers;

(9) The estimated depths at which anticipated water, brines, oil, gas, or other mineral bearing formations are expected to be encountered;

(10) The nature and extent of the known deposit or reservoir to be produced and a description of the proposed operations, including:

(i) The proposed casing program, including the size, grade, and weight of each string, and whether it is new or used;

(ii) The proposed setting depth of each casing string, and the amount of type of cement, including additives, to be used;

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(iii) The operator's minimum specifications for pressure control equipment which is to be used, a schematic diagram thereof showing sizes, pressure ratings, and the testing procedures and testing frequency;

(iv) The type and characteristics of the proposed circulating medium or mediums to be employed for rotary drilling and the quantities and types of mud and weighting material to be maintained;

(v) The testing, logging, and coring programs to be followed;

(vi) Anticipated abnormal pressures or temperatures expected to be encountered; or potential hazards to persons and the environment such as hydrogen sulfide gas or oil spills, along with plans for mitigation of such hazards;

(11) A description of the steps to be taken to comply with the applicable operating standards of § 9.41 of this subpart;

(12) Provisions for reclamation which will result in compliance with the requirements of § 9.39:

(13) A breakdown of the estimated costs to be incurred during the implementation of the reclamation plan;

(14) Methods for disposal of all rubbish and other solid and liquid wastes, and contaminating substances;

(15) An affidavit stating that the operations planned are in compliance with all applicable Federal, State and local laws and regulations

(16) Background information, including:

(i) A description of the natural, cultural, social and economic environments to be affected by operations, including a description and/or map(s) of the location of all water, abandoned, temporarily abandoned, disposal, production, and drilling wells of public record within a two-mile radius of the proposed site. Where such information is available from documents identified in § 9.36(d), specific reference to the document and the location within the document where such information can be found will be sufficient to satisfy this requirement

(ii) The anticipated direct and indirect effects of the operations on the unit's natural, cultural, social, and economic environment;

(iii) Steps to be taken to insure minimum surface disturbance and to mitigate any adverse environmental effects, and a discussion of the impacts which cannot be mitigated

(iv) Measures to protect surface and subsurface waters by means of casing and cement, etc.

(v) All reasonable technologically feasible alternative methods of operations their costs, and their environmental effects, and

(vi) The effects of the steps to be taken to achieve reclamation

(17) Any other facets of the proposed operations which the operator wishes to point out for consideration; and

(18) Any additional information that is required to enable the Superintendent to establish whether the operator has the right to conduct operations as specified in the plan of operations; to effectively analyze the effects that the operations will have on the preservation, management and public use of the unit, and to make a recommendation to the Regional Director regarding approval or disapproval of the plan of operations and the amount of the performance bond to be posted.

(b) Where any information required to be submitted as part of a proposed plan of operations has been submitted to the Superintendent in substantially the same form in a prior approved plan of operations, a specific cross-reference to that information contained in the prior approved plan of operations will be sufficient to incorporate it into the proposed plan and will satisfy the applicable requirement of this section.

(c) Information and materials submitted in compliance with this section will not constitute a plan of operations until information required by § 9.36(a) (1) through (18), which the Superintendent determines as pertinent to the type of operations proposed, has been submitted to and determined adequate by the Regional Director.

(d) In all cases the plan of operations must consider and discuss the unit's Statement for Management and other planning documents as furnished by the Superintendent, and activities to control, minimize or prevent damage to the recreational, biological physical, scientific, cultural, and scenic resources of the unit, and any reclamation procedures suggested by the Superintendent.

[43 FR 57825, Dec. 8, 1978; 44 FR 37914, June 29, 1979]

§ 9.37 Plan of operations approval.

(a) The Regional Director shall not approve a plan of operations:

(1) Until the operator shows that the operations will be conducted in a manner which utilizes technologically feasible methods least damaging to the federally-owned or controlled lands, waters and resources of the unit while assuring the protection of public health and safety.

(2) For operations at a site the surface estate of which is not owned by the federal government, where operations would constitute a nuisance to federal lands or waters in the vicinity of the operations, would significantly injure federally-owned or controlled lands and waters; or

(3) For operations at a site the surface estate of which is owned or controlled by the federal government, where operations would substantially interfere with management of the unit to ensure the preservation of its natural and ecological integrity in perpetuity, or would significantly injure the federally-owned or controlled lands or waters; Provided, however, that if the application of this standard would under applicable law, constitute a taking of a property interest rather than an appropriate exercise of regulatory authority, the plan of operations may be approved if the operations would be conducted in accordance with paragraph (a)(1) of this section, unless a decision is made to acquire the mineral interest.

(4) Where the plan of operations does not satisfy each of the requirements of § 9.36 applicable to the operations proposed.

(b) Within sixty (60) days of the receipt of a plan of operations, the Regional Director shall make an environmental analysis of such plan, and:

(1) Notify the operator that the plan of operations has been approved or rejected, and, if rejected, the reasons for the rejection; or

(2) Notify the operator that the plan of operations has been conditionally approved, subject to the operator's acceptance of specific provisions and stipulations; or

(3) Notify the operator of any modification of the plan of operations which is necessary before such plan will be approved or of additional information needed to effectively analyze the effects that the operations will have on the preservation, management and use of the unit, and to make a decision regarding approval or disapproval of the plan of operations and the amount of the performance bond to be posted; or

(4) Notify the operator that the plan of operations is being reviewed, but that more time, not to exceed an additional thirty days, is necessary to complete such review, and setting forth the reasons why additional time is required. Provided, however, That days during which the area of operations is inaccessible for such reasons as inclement weather, natural catastrophe acts of God, etc., for inspection shall not be included when computing either this time period, or that in subsection (b) above; or

(5) Notify the operator that the plan of operations has been reviewed, but cannot be considered for approval until forty-five (45) days after a final environmental statement has been prepared and filed with the Environmental Protection Agency; or

(6) Notify the operator that the plan of operations is being reviewed, but that more time to provide opportunities for public participation in the plan of operations review and to provide sufficient time to analyze public comments received is necessary. Within thirty (30) days after closure of the public comment period specified by the Regional Director, he shall comply with § 9.37(b) (1) through (5).

(c) The Regional Director shall act as expeditiously as possible upon a proposed plan of operations consistent with the nature and scope of the operations proposed. Failure to act within the time limits specified in this section shall constitute a rejection of the plan of operations from which the operator shall have a right to appeal under § 9.49.

(d) The Regional Director's analysis shall include:

(1) An examination of all information submitted by the operator;

(2) An evaluation of measures and timing required to comply with reclamation requirements;

(3) An evaluation of necessary conditions and amount of the bond or security deposit (See § 9.48);

(4) An evaluation of the need for any additional requirements in the plan;

(5) A determination regarding the impact of this operation and cumulative impacts of all proposed and existing operations on the management of the unit; and

(6) A determination whether implementation by the operator of an approved plan of operations would be a major Federal action significantly affecting the quality of the human environment or would be sufficiently controversial to warrant preparation of an environmental statement pursuant to section 102(2)(c) of the National Environmental Policy Act of 1969.

(e) Prior to approval of a plan of operations, the Regional Director shall determine whether any properties included in, or eligible for inclusion in the National Register of Historic Places or National Registry of Natural Landmarks may be affected by the proposed operations. This determination will require the acquisition of adequate information, such as that resulting from field surveys, in order to properly determine the presence and significance of cultural resources within the areas to be affected by operations. Whenever National Register properties or properties eligible for inclusion in the National Register would be affected by operations, the Regional Director shall comply with Section 106 of the Historic Preservations Act of 1966 as implemented by 36 C.F.R. Part 800.

(f) Approval of each plan of operations is expressly conditioned upon the Superintendent having such reasonable access to the site as is necessary to properly monitor and insure compliance with the plan of operations.

[43 FR 57825, Dec. 8, 1978; 44 FR 37914, June 29, 1979]

§ 9.38 Temporary approval.

(a) The Regional Director may approve on a temporary basis:

(1) Access on, across or through federally-owned or controlled lands or waters for the purpose of collecting basic information necessary to enable timely compliance with these regulations. Such temporary approval shall be for a period not in excess of sixty (60) days.

(2) The continuance of existing operations, if their suspension would result in an unreasonable economic burden or injury to the operator; provided that such operations must be conducted in accordance with all applicable laws, and in a manner prescribed by the Regional Director designed to minimize or prevent significant environmental damage; and provided that within sixty (60) days of the granting of such temporary approval the operator either:

(i) Submits an initial substantially complete plan of operations; or

(ii) If a proposed plan of operations has been submitted, responds to any outstanding requests for additional information.

(b) The Regional Director may approve new operations on a temporary basis only when:

(1) The Regional Director finds that the operations will not cause significant environmental damage or result in significant new or additional surface disturbance to the unit; and either

(2) The operator can demonstrate a compelling reason for the failure to have had timely approval of a proposed plan of operations; or

(3) The operator can demonstrate that failure to grant such approval will result in an unreasonable economic burden or injury to the operator.

[43 FR 57825, Dec. 8, 1978, as amended at 44 FR 37914, June 29, 1979]

§ 9.39 Reclamation requirements.

(a) Within the time specified by the reclamation provisions of the plan of operations, which shall be as soon as possible after completion of approved operations and shall not be later than six (6) months thereafter unless a longer period of time is authorized in writing by the Regional Director, each operator shall initiate as follows:

(1) Where the Federal government does not own the surface estate the operator shall at a minimum:

(i) Remove or neutralize any contaminating substances; and

(ii) Rehabilitate the area of operations to a condition which would not constitute a nuisance or would not adversely affect, injure, or damage federally-owned lands or waters, including removal of above ground structures and equipment used for operations, except that such structures and equipment may remain where they are to be used for continuing operations which are the subject of another approved plan of operations or of a plan which has been submitted for approval.

(2) On any site where the surface estate is owned or controlled by the Federal government, each operator must take steps to restore natural conditions and processes. These steps shall include but are not limited to:

(i) Removing all above ground structures, equipment and roads used for operations, except that such structures, equipment and roads may remain where they are to be used for continuing operations which are the subject of another approved plan of operations or of a plan which has been submitted for approval, or unless otherwise authorized by the Regional Director consistent with the unit purpose and management objectives;

(ii) Removing all other man-made debris resulting from operations;

(iii) Removing or neutralizing any contaminating substances;

(iv) Plugging and capping all nonproductive wells and filling dump holes, ditches, reserve pits and other excavations;

(v) Grading to reasonably conform the contour of the area of operations to a contour similar to that which existed prior to the initiation of operations, where such grading will not jeopardize reclamation;

(vi) Replacing the natural topsoil necessary for vegetative restoration; and

(vii) Reestablishing native vegetative communities.

(b) Reclamation under paragraph (a)(2) of this section is unacceptable unless it provides for the safe movement of native wildlife, the reestablishment of native vegetative communities, the normal flow of surface and reasonable flow of subsurface waters, and the return of the area to a condition which does not jeopardize visitor safety or public use of the unit.

§ 9.40 Supplementation or revision of plan of operations.

(a) A proposal to supplement or revise an approved plan of operations may be made by either the operator or the Regional Director to adjust the plan to changed conditions or to address conditions not previously contemplated by notifying the appropriate party in writing of the proposed alteration and the justification therefore.

(b) Any proposed supplementation or revision of a plan of operations initiated under paragraph (a) of this section by either party shall be reviewed and acted on by the Regional Director in accordance with § 9.37. If failure to implement proposed changes would not pose an immediate threat of significant injury to federally-owned or controlled lands or waters, the operator will be notified in writing sixty (60) days prior to the date such changes become effective, during which time the operator may submit comments on proposed changes. If failure to implement proposed changes would pose immediate threat of significant injury to federally-owned or controlled lands or waters, the provisions of § 9.33(c) apply.

§ 9.41 Operating Standards.

The following standards shall apply to operations within a unit:

(a) Surface operations shall at no time be conducted within 500 feet of the banks of perennial, intermittent or ephemeral watercourses; or within 500 feet of the high pool shoreline of natural or man-made impoundments; or within 500 feet of the mean high tide line; or within 500 feet of any structure or facility (excluding roads) used for unit interpretation, public recreation or for administration of the unit unless specifically authorized by an approved plan of operations.

(b) The operator shall protect all survey monuments, witness corners, reference monuments and bearing trees against destruction, obliteration, or damage from operations and shall be responsible for the reestablishment, restoration, or referencing of any monuments, corners and bearing trees which are destroyed, obliterated, or damaged by such operations.

(c) Whenever drilling or producing operations are suspended for 24 hours or more, but less than 30 days, the wells shall be shut in by closing wellhead valves or blowout prevention equipment. When producing operations are suspended for 30 days or more, a suitable plug or other fittings acceptable to the Superintendent shall be used to close the wells.

(d) The operator shall mark each and every operating derrick or well in a conspicuous place with his name or the name of the owner, and the number and location of the well, and shall take all necessary means and precautions to preserve these markings.

(e) Around existing or future installations, e.g., well, storage tanks, all high pressure facilities, fences shall be built for protection of unit visitors and wildlife, and protection of said facilities unless otherwise authorized by the Superintendent. Fences erected for protection of unit visitors and wildlife shall be of a design and material acceptable to the Superintendent, and where appropriate, shall have at least one gate which is of sufficient width to allow access by fire trucks. Hazards within visitor use areas will be clearly marked with warning signs acceptable to the Superintendent.

(f) The operator shall carry on all operations and maintain the site at all times in a safe and workmanlike manner, having due regard for the preservation of the environment of the unit. The operator shall take reasonable steps to prevent and shall remove accumulations of oil or other materials deemed to be fire hazards from the vicinity of well locations and lease tanks, and shall remove from the property or store in an orderly manner all scrap or other materials not in use.

(g) Operators will be held fully accountable for their contractor's or subcontractor's compliance with the requirements of the approved plan of operations.

[43 FR 57825, Dec. 8, 1978; 44 FR 37915, June 29, 1979]

§ 9.42 Well records and reports, plots and maps, samples, tests and surveys.

Any technical data gathered during the drilling of any well, including daily drilling reports and geological reports, which are submitted to the State pursuant to State regulations, or to any other bureau or agency of the Federal government shall be available for inspection by the Superintendent upon his request.

§ 9.43 Precautions necessary in areas where high pressures are likely to exist.

When drilling in "wildcat" territory, or in any field where high pressures are likely to exist, the operator shall take all necessary precautions for keeping the well under control at all times and shall install and maintain the proper high-pressure fittings and equipment to assure proper well control. Under such conditions the surface string must be cemented through its length, unless another procedure is authorized or prescribed by the Superintendent, and all strings of casing must be securely anchored.

§ 9.44 Open flows and control of "wild" wells.

The operator shall take all technologically feasible precautions to prevent any oil, gas, or water well from blowing open or becoming "wild," and shall take immediate steps and exercise due diligence to bring under control any "wild" well, or burning oil or gas well.

§ 9.45 Handling of wastes.

Oilfield brine, and all other waste and contaminating substances must be kept in the smallest practicable area, must be confined so as to prevent escape as a result of percolation, rain high water or other causes, and such wastes must be stored and disposed of or removed from the area as quickly as practicable in such a manner as to prevent contamination, pollution, damage or injury to the lands, water (surface and subsurface), facilities, cultural resources, wildlife, and vegetation of or visitors of the unit.

§ 9.46 Accidents and fires.

The operator shall take technologically feasible precautions to prevent accidents and fires, shall notify the Superintendent within 24 hours of all accidents involving serious personal injury or death, or fires on the site, and shall submit a full written report thereon within ninety (90) days. This report supersedes the requirement outlined in 36 C.F.R. 2.17, but does not relieve persons from the responsibility of making any other accident reports which may be required under State or local laws.

§ 9.47 Cultural resource protection.

(a) Where the surface estate of the site is owned by the United States, the operator shall not, without written authorization of the Superintendent, injure, alter, destroy, or collect any site, structure, object, or other value of historical, archeological, or other cultural scientific importance in violation of the Antiquities Act (16 U.S.C. 431-433 (See 43 C.F.R. Part 3)).

(b) Once approved operations have commenced, the operator shall immediately bring to the attention of the Superintendent any cultural or scientific resource encountered that might be altered or destroyed by his operation and shall leave such discovery intact until told to proceed by the Superintendent. The

Superintendent will evaluate the discoveries brought to his attention, and will determine within ten (10) working days what action will be taken with respect to such discoveries.

§ 9.48 Performance bond.

(a) Prior to approval of a plan of operations, the operator shall be required to file a suitable performance bond with satisfactory surety, payable to the Secretary or his designee. The bond shall be conditioned upon faithful compliance with applicable regulations, and the plan of operations as approved, revised or supplemented. This performance bond is in addition to and not in lieu of any bond or security deposit required by other regulatory authorities.

(b) In lieu of a performance bond, an operator may elect to deposit with the Secretary or his designee, cash or negotiable bonds of the U.S. Government. The cash deposit or the market value of such securities shall be at least equal to the required sum of the bond. When bonds are to serve as security, there must be provided to the Secretary a power of attorney.

(c) In the event that an approved plan of operations is revised or supplemented in accordance with § 9.40, the Regional Director may adjust the amount of the bond or security deposit to conform to the modified plan of operations.

(d) The bond or security deposit shall be in an amount:

(1) Equal to the estimated cost of reclaiming the site, either in its entirety or in phases, that has been damaged or destroyed as a result of operations conducted in accordance with an approved, supplemented, plan of operations; plus

(2) An amount set by the Superintendent consistent with the type of operations proposed, to bond against the liability imposed by § 9.51(a); to provide the means for rapid and effective cleanup; and to minimize damages resulting from an oil spill, the escape of gas, wastes, contaminating substances, or fire caused by operations. This amount shall not exceed twenty-five thousand dollars (\$25,000) for geophysical surveys when using more than one field party or five thousand dollars (\$5,000) when operating with only one field party, and shall not exceed fifty thousand dollars (\$50,000) for each wellsite or other operation.

(3) When an operator's total bond or security deposit with the National Park Service amounts to two hundred thousand dollars (\$200,000) for activities conducted within a given unit, no further bond requirements shall be collected for additional activities conducted within that unit, and the operator may substitute a blanket bond of two hundred thousand dollars (\$200,000) for all operations conducted within the unit.

(e) The operator's and his surety's responsibility and liability under the bond or security deposit shall continue until such time as the Superintendent determines that successful reclamation of the area of operations has occurred and, where a well has been drilled, the well has been properly plugged and abandoned. If all efforts to secure the operator's compliance with pertinent provisions of the approved plan of operations are unsuccessful, the operator's surety company will be required to perform reclamation in accordance with the approved plan of operations.

(f) Within thirty (30) days after determining that all reclamation requirements of an approved plan of operations are completed, including proper abandonment of the well, the Regional Director shall notify the operator that the period of liability under the bond or security deposit has been terminated.

[43 FR 57825, Dec. 8, 1978; 44 FR 37915 June 29, 1979]

§ 9.49 Appeals.

(a) Any operator aggrieved by a decision of the Regional Director in connection with the regulations in this Subpart may file with the Regional Director a written statement setting forth in detail the respects in which the decision is contrary to, or is in conflict with the facts, the law, or these regulations, or is otherwise in error. No such appeal will be considered unless it is filed with the Regional Director within thirty (30) days after the date of notification to the operator of the action or decision complained of. Upon receipt of such written statement from the aggrieved operator, the Regional Director shall promptly review the action or decision and either reverse his original decision or prepare his own statement, explaining that decision and the reasons therefore, and forward the statement and record on appeal to the Director for review and decision. Copies of the Regional Director's statement shall be furnished to the aggrieved operator, who shall have thirty (30) days within which to file exceptions to the Regional Director's decision. The Department has the discretion to initiate a hearing before the Office of Hearing and Appeals in a particular case (See 43 C.F.R. 4.700).

(b) The official files of the National Park Service on the proposed plan of operations and any testimony and documents submitted by the parties on which the decision of the Regional Director was based shall constitute the record on appeal. The Regional Director shall maintain the record under separate cover and shall certify that it was the record on which his decision was based at the time it was forwarded to the Director of the National Park Service. The National Park Service shall make the record available to the operator upon request.

(c) If the Director considers the record inadequate to support the decision on appeal, he may provide for the production of such additional evidence or information as may be appropriate, or may remand the case to the Regional Director, with appropriate instructions for further action.

(d) On or before the expiration of forty-five (45) days after his receipt of the exceptions to the Regional Director's decision, the Director shall make his decision in writing; provided however, that if more than forty-five (45) days are required for a decision after the exceptions are received, the Director shall notify the parties to the appeal and specify the reason(s) for delay. The decision of the Director shall include: (1) A statement of facts; (2) conclusions; and (3) reasons upon which the conclusions are based. The decision of the Director shall be the final administrative action of the agency on a proposed plan of operations.

(e) A decision of the Regional Director from which an appeal is taken shall not be automatically stayed by the filing of a statement of appeal. A request for a stay may accompany the statement of appeal or may be directed to the Director. The Director shall promptly rule on requests for stays. A decision of the Director on request for a stay shall constitute a final administrative decision.

(f) Where, under this Subpart, the Superintendent has the authority to make the original decision, appeals may be taken in the manner provided by this section, as if the decision had been made by the Regional Director, except that the original statement of appeal shall be filed with the Superintendent, and if he decides not to reverse his original decision, the Regional Director shall have, except as noted below, the final review authority. The only decision of a Regional Director under this paragraph which shall be appealable by the Director is an appeal from a suspension under § 9.51(b). Such an appeal shall follow the procedure of paragraphs (a)-(3) of this section.

[43 FR 57825, Dec. 8, 1978; 44 FR 37915, June 29, 1979]

§ 9.50 Use of roads by commercial vehicles.

(a) After January 8, 1978, no commercial vehicle shall use roads administered by the National Park Service without being registered with the Superintendent. Roads must be used in accordance with procedures outlined in an approved plan of operations.

(1) A fee shall be charged for such registration and use based upon a posted fee schedule. The fee schedule posted shall be subject to change upon sixty (60) days of notice.

(2) An adjustment of the fee may be made at the discretion of the Superintendent where a cooperative maintenance agreement is entered into with the operator.

(b) No commercial vehicle which exceeds roadway load limits specified by the Superintendent shall be used on roads administered by the National Park Service unless authorized in writing by the Superintendent, or unless authorized by an approved plan of operations.

(c) Should a commercial vehicle used in operations cause damage to roads, resources or other facilities of the National Park Service, the operator shall be liable for all damages so caused.

§ 9.51 Damages and penalties.

(a) The operator shall be held liable for any damages to federally-owned or controlled lands, waters, or resources resulting from his failure to comply with either his plan of operations, or where operations are continued pursuant to § 9.33, failure to comply with the applicable permit or, where operations are temporarily approved under § 9.38, failure to comply with the terms of that approval.

(b) The operator agrees, as a condition for receiving an approved plan of operations, that he will hold harmless the United States and its employees from any damages or claims for injury or death of persons and damage or loss of property by any person or persons arising out of any acts or omissions by the operator, his agents, employees or subcontractors done in the course of operations.

(c) Undertaking any operations within the boundaries of any unit in violation of this Subpart shall be deemed a trespass against the United States and shall be cause for revocation of approval of the plan of operations.

(1) When a violation by an operator under an approved plan of operations is discovered, and if it does not pose an immediate threat of significant injury to federally-owned or controlled lands or waters, the operator will be notified in writing by the Superintendent and will be given ten (10) days to correct the violation; if the violation is not corrected within ten (10) days approval of the plan of operations will be suspended until such time as the violation is corrected.

(2) If the violation poses an immediate threat of significant injury to federally-owned or controlled lands or waters, approval of the plan of operations will be immediately suspended until such time as the violation is corrected. The operator will be notified in writing within five (5) days of any suspension and shall have the right to appeal that decision under § 9.48.

(3) Failure to correct any violation or damage to federally owned or controlled lands, waters or resources caused by such violations will result in revocation of plan of operations approval.

[43 FR 57825, Dec. 8, 1978; 44 FR 37915, June 29, 1979]

§ 9.52 Public inspection of documents.

(a) When a Superintendent receives a request for permission for access on, across or through federally-owned or controlled lands or waters for the purpose of conducting operations, the Superintendent shall publish a notice of this request in a newspaper of general circulation in the county(s) in which the lands are situated, or in such publications as deemed appropriate by the Superintendent.

(b) Upon receipt of the plan of operations in accordance with § 9.35(c), the Superintendent shall publish a notice in the FEDERAL REGISTER advising the availability of the plan for public review and comment. Written comments received within thirty (30) days will become a part of the official record. As a result of comments received or if otherwise deemed appropriate by the Superintendent, he may provide additional opportunity for public participation to review the plan of operations.

(c) Any document required to be submitted pursuant to the regulations in this Subpart shall be made available for public inspection at the office of the Superintendent during normal business hours, unless otherwise available pursuant to § 9.51(b). This does not include those records only made available for the Superintendent's inspection under § 9.41 of this Subpart or those records determined by the Superintendent to contain proprietary or confidential information. The availability of such records for inspection shall be governed by the rules and regulations found at 43 C.F.R. Part 2.

[43 FR 57825, Dec. 8, 1978; 44 FR 37915, June 29, 1979]

APPENDIX C: SITE-SPECIFIC WELL DATA

Appendices

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Big South Fork National River and Recreation Area																						
Bowen R H 1	5859	Amtex Resources	Grandfathered				Lily loam, 5 to 12 percent slopes									Successional Forest						
Bowen R H 13	5865	Amtex Resources	Grandfathered				Lily-Ramsey complex, 5 to 12 percent slopes									Successional Forest						
Bowen R H 9	5861	Amtex Resources	Grandfathered	yes	262	Geo_Feature "Christian Tunnel"	Gilpin-Bouldin complex, 20 to 75 percent slopes, very stony									Mixed Pine – Oak Forest						
Bruno Gernt 4	6194	Amtex Resources	Grandfathered				Lily-Ramsey complex, 20 to 35 percent slopes									Lowland or Submontaine Cold Deciduous Forest						
Carson/Rugby PFG-V-1 1	4372	B-J, Inc.	Grandfathered				Lonewood silt loam, 5 to 12 percent slopes				yes	491	R3UB1H, Riverine	yes	483	Pine Forest						
Hull Carson 1	1453	B-J, Inc.	Grandfathered				Lily-Ramsey complex, 20 to 35 percent slopes									Pine Forest						
Hull Carson CA-1981-1 1	4496	B-J, Inc.	Grandfathered				Lily-Ramsey complex, 20 to 35 percent slopes									Pine Forest						
Hull Carson CS 1	5148	B-J, Inc.	Grandfathered				Lily loam, 5 to 12 percent slopes									Pine Forest						
Hull-rosenbaum CA 1	5092	B-J, Inc.	Grandfathered				Gilpin-Sequoia complex, 5 to 12 percent slopes	yes	473	Lake/Pond						Pine Forest						
Hull-Tompkins-Rosenbaum JDE-1 1	4991	B-J, Inc.	Grandfathered				Lily loam, 5 to 12 percent slopes									Mixed Pine – Oak Forest						
John Satelle 3	7082	Cooper, William III	Grandfathered				Gilpin-Petros complex, 20 to 35 percent slopes									Mixed Pine – Oak Forest						
Owens John Wesley 1	7313	Ace Petroleum Company	Grandfathered				Lily loam, 5 to 12 percent slopes									Hemlock – White Pine Forest						
Reed/Ray 1	8706	Cambridge Resources	Grandfathered	yes	467	Cliff Face	Lily-Gilpin complex, 5 to 12 percent slopes									Pine Forest						
Rugby Land Co 1	5495	Clowes & Ray Oil Producers	Grandfathered				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Hemlock – White Pine Forest						
Rugby Land Co 1	6881	A B C Petroleum	Grandfathered	yes	320	Cliff Face	Lily loam, 5 to 12 percent slopes	yes	485	Perennial Stream	yes	487	R3UB1H, Riverine	yes	456	Herbaceous						
Rugby Land Co BJI-1981-1	4831	B-J, Inc.	Grandfathered				Lily loam, 5 to 12 percent slopes									Pine Forest						
Rugby Land Co JDE 1	4830	B-J, Inc.	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes	yes	247	Perennial Stream	yes	214	R3UB1H, Riverine	yes	198	Herbaceous						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Big South Fork National River and Recreation Area (continued)																						
Rugby Land Co MC-1981-02	4930	B-J, Inc.	Grandfathered				Gilpin-Bouldin-Petros complex, 25 to 75 percent slopes, very stony									Pine Forest						
Tompkins Ed CS-1 1	5037	B-J, Inc.	Grandfathered				Gilpin silt loam, 12 to 20 percent slopes									Pine Forest						
NA	1622	NA	Grandfathered				Gilpin silt loam, 12 to 20 percent slopes									Successional Forest						
NA	0579	NA	Grandfathered				Gilpin silt loam, 5 to 12 percent slopes									Successional Forest						
NA	2706	NA	Grandfathered				Gilpin silt loam, 5 to 12 percent slopes									Herbaceous						
NA	8559	NA	Grandfathered				Gilpin silt loam, 5 to 12 percent slopes									Lowland or Submontaine Cold Deciduous Forest						
NA	1548	NA	Grandfathered				Gilpin silt loam, 5 to 20 percent slopes, eroded									Pine Forest						
NA	2233	NA	Grandfathered				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Hemlock – White Pine Forest						
NA	3626	NA	Grandfathered				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Successional Forest						
NA	5975	NA	Grandfathered				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Hemlock – White Pine Forest						
NA	0560	NA	Grandfathered				Gilpin-Petros complex, 20 to 35 percent slopes									Successional Forest						
NA	1504	NA	Grandfathered				Gilpin-Petros complex, 20 to 35 percent slopes									Mixed Pine – Oak Forest						
NA	2123	NA	Grandfathered				Gilpin-Petros complex, 20 to 35 percent slopes	yes	467	Perennial Stream	yes	492	R3UB1H, Riverine	yes	435	Lowland or Submontaine Cold Deciduous Forest						
NA	3571	NA	Grandfathered	yes	17	Cliff Face	Gilpin-Petros complex, 20 to 35 percent slopes							yes	492	Successional Forest						
NA	4244	NA	Grandfathered	yes	95	Cliff Face	Gilpin-Petros complex, 20 to 35 percent slopes							yes	488	Hemlock – White Pine Forest						
NA	4658	NA	Grandfathered				Gilpin-Petros complex, 20 to 35 percent slopes									Hemlock – White Pine Forest						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Big South Fork National River and Recreation Area (continued)																						
NA	6056	NA	Grandfathered				Gilpin-Petros complex, 20 to 35 percent slopes									Pine Forest						
NA	6519	NA	Grandfathered	yes	411	Cliff Face	Gilpin-Petros complex, 20 to 35 percent slopes	yes	471	Perennial Stream	yes	451	R3UB1H, Riverine	yes	380	Pine Forest						
NA	6602	NA	Grandfathered	yes	500	Cliff Face	Gilpin-Petros complex, 20 to 35 percent slopes	yes	456	Perennial Stream	yes	426	R3RB2H, Riverine	yes	366	Lowland or Submontaine Cold Deciduous Forest						
NA	6924	NA	Grandfathered				Gilpin-Petros complex, 20 to 35 percent slopes									Pine Forest						
NA	2037	NA	Grandfathered	yes	52	Cliff Face	Lily loam, 12 to 20 percent slopes									Lowland or Submontaine Cold Deciduous Forest						
NA	8346	NA	Grandfathered				Lily loam, 2 to 5 percent slopes									Successional Forest						
NA	0822	NA	Grandfathered				Lily loam, 3 to 8 percent slopes									Developed or Disturbed						
NA	1145	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Pine Forest						
NA	1872	NA	Grandfathered	yes	326	Cliff Face	Lily loam, 5 to 12 percent slopes									Pine Forest						
NA	2070	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Hemlock – White Pine Forest						
NA	2082	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Hemlock – White Pine Forest						
NA	2167	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Pine Forest						
NA	2198	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Hemlock – White Pine Forest						
NA	2361	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Successional Forest						
NA	3046	NA	Grandfathered	yes	35	Cliff Face	Lily loam, 5 to 12 percent slopes									Lowland or Submontaine Cold Deciduous Forest						
NA	3234	NA	Grandfathered	yes	486	Cliff Face	Lily loam, 5 to 12 percent slopes									Hemlock – White Pine Forest						
NA	3298	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Lowland or Submontaine Cold Deciduous Forest						
NA	3323	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Pine Forest						
NA	3589	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Lowland or Submontaine Cold Deciduous Forest						
NA	6036	NA	Grandfathered				Lily loam, 5 to 12 percent slopes	yes	492	Perennial Stream	yes	490	R3UB1H, Riverine	yes	405	Lowland or Submontaine Cold Deciduous Forest						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Big South Fork National River and Recreation Area (continued)																						
NA	6037	NA	Grandfathered				Lily loam, 5 to 12 percent slopes							yes	462	Lowland or Submontaine Cold Deciduous Forest						
NA	6356	NA	Grandfathered	yes	351	Cliff Face	Lily loam, 5 to 12 percent slopes									Pine Forest						
NA	6399	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Hemlock – White Pine Forest						
NA	7645	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Pine Forest						
NA	8372	NA	Grandfathered				Lily loam, 5 to 12 percent slopes									Developed or Disturbed						
NA	0467	NA	Grandfathered				Lily-Gilpin complex, 12 to 20 percent slopes									Successional Forest						
NA	0531	NA	Grandfathered				Lily-Gilpin complex, 12 to 20 percent slopes									Successional Forest						
NA	13306	NA	Grandfathered	yes	52	Cliff Face	Lily-Gilpin complex, 12 to 20 percent slopes									Lowland or Submontaine Cold Deciduous Forests						
NA	4747	NA	Grandfathered				Lily-Gilpin complex, 20 to 35 percent slopes									Pine Forest	yes	188.6	Polygon - Station camp collector access			
NA	0562	NA	Grandfathered				Lily-Gilpin complex, 5 to 12 percent slopes									Successional Forest						
NA	1677	NA	Grandfathered				Lily-Gilpin complex, 5 to 12 percent slopes									Successional Forest						
NA	2593	NA	Grandfathered				Lily-Gilpin complex, 5 to 12 percent slopes									Successional Forest						
NA	6108	NA	Grandfathered				Lily-Gilpin complex, 5 to 12 percent slopes									Lowland or Submontaine Cold Deciduous Forest						
NA	1102	NA	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes									Lowland or Submontaine Cold Deciduous Forest						
NA	1577	NA	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes									Pine Forest						
NA	1776	NA	Grandfathered	yes	0	Cliff Face	Lily-Ramsey complex, 12 to 20 percent slopes									Hemlock – White Pine Forest						
NA	1951	NA	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes									Pine Forest						
NA	2118	NA	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes									Lowland or Submontaine Cold Deciduous Forest						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Big South Fork National River and Recreation Area (continued)																						
NA	2190	NA	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes									Lowland or Submontaine Cold Deciduous Forest						
NA	2856	NA	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes									Successional Forest						
NA	3297	NA	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes									Pine Forest						
NA	3868	NA	Grandfathered	yes	190	Cliff Face	Lily-Ramsey complex, 12 to 20 percent slopes									Pine Forest						
NA	5175	NA	Grandfathered	yes	0	Cliff Face	Lily-Ramsey complex, 12 to 20 percent slopes									Lowland or Submontaine Cold Deciduous Forests						
NA	5752	NA	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes									Successional Forest						
NA	5782	NA	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes	yes	434	Perennial Stream	yes	445	R3UB1H, Riverine	yes	396	Lowland or Submontaine Cold Deciduous Forests						
NA	5989	NA	Grandfathered				Lily-Ramsey complex, 12 to 20 percent slopes	yes	419	Perennial Stream	yes	415	R3UB1H, Riverine	yes	330	Lowland or Submontaine Cold Deciduous Forests						
NA	6255	NA	Grandfathered	yes	359	Cliff Face	Lily-Ramsey complex, 12 to 20 percent slopes									Lowland or Submontaine Cold Deciduous Forests						
NA	1977	NA	Grandfathered				Lily-Ramsey complex, 20 to 35 percent slopes									Pine Forest						
NA	5958	NA	Grandfathered				Lily-Ramsey complex, 20 to 35 percent slopes									Pine Forest						
NA	6107	NA	Grandfathered	yes	89	Cliff Face	Lily-Ramsey complex, 20 to 35 percent slopes									Pine Forest						
NA	8437	NA	Grandfathered				Lily-Ramsey complex, 20 to 35 percent slopes									Herbaceous						
NA	8541	NA	Grandfathered				Lily-Ramsey complex, 5 to 12 percent slopes									Developed or Disturbed						
NA	0435	NA	Grandfathered				Lonewood silt loam, 2 to 5 percent slopes									Successional Forest						
NA	0443	NA	Grandfathered				Lonewood silt loam, 2 to 5 percent slopes									Hemlock – White Pine Forest						
NA	4909	NA	Grandfathered				Lonewood silt loam, 5 to 12 percent slopes							yes	496	Hemlock – White Pine Forest						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Big South Fork National River and Recreation Area (continued)																						
NA	6993	NA	Grandfathered				Lonewood silt loam, 5 to 12 percent slopes									Pine Forest						
NA	7108	NA	Grandfathered				Lonewood silt loam, 5 to 12 percent slopes									Pine Forest						
NA	1376	NA	Grandfathered				Ramsey-Alticrest-Rock outcrop complex, 5 to 20 percent slopes									Mixed Pine – Oak Forest						
NA	1403	NA	Grandfathered	yes	498	Cliff Face	Ramsey-Alticrest-Rock outcrop complex, 5 to 20 percent slopes							yes	444	Lowland or Submontaine Cold Deciduous Forests						
NA	1762	NA	Grandfathered				Rock outcrop-Ramsey complex, 20 to 70 percent slopes									Pine Forest						
NA	3454	NA	Grandfathered				Wernock silt loam, 2 to 5 percent slopes							yes	493	Successional Forest						
NA	4657	NA	Grandfathered	yes	217	Cliff Face	Wernock silt loam, 2 to 5 percent slopes									Developed or Disturbed						
NA	3570	NA	Grandfathered	yes	431	Cliff Face	Wernock silt loam, 5 to 12 percent slopes									Developed or Disturbed						
NA	5789	NA	Grandfathered				Wernock silt loam, 5 to 12 percent slopes									Successional Forest						
NA	6183	NA	Grandfathered				Wernock silt loam, 5 to 12 percent slopes									Pine Forest						
Plateau Properties 1	1371	BB Petroleum	No Federal Access				Gilpin-Petros complex, 20 to 35 percent slopes									Hemlock – White Pine Forest						
Plateau Properties 5	6641	BB Petroleum	No Federal Access				Gilpin silt loam, 12 to 20 percent slopes									Successional Forest						
Plateau Properties 6	6744	BB Petroleum	No Federal Access				Gilpin silt loam, 5 to 12 percent slopes									Lowland or Submontaine Cold Deciduous Forests						
Plateau Properties 7	6880	BB Petroleum	No Federal Access				Gilpin-Petros complex, 20 to 35 percent slopes									Lowland or Submontaine Cold Deciduous Forests						
Plateau Properties 3	1522	BB Petroleum	No Federal Access				Gilpin silt loam, 12 to 20 percent slopes									Herbaceous						
NA	1509	NA	No Federal Access				Gilpin silt loam, 12 to 20 percent slopes									Herbaceous						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Big South Fork National River and Recreation Area (continued)																						
NA	1591	NA	No Federal Access				Gilpin silt loam, 12 to 20 percent slopes									Lowland or Submontaine Cold Deciduous Forests						
NA	1475	NA	No Federal Access				Gilpin silt loam, 5 to 12 percent slopes									Successional Forest						
NA	1997	NA	No Federal Access				Gilpin silt loam, 5 to 12 percent slopes									Lowland or Submontaine Cold Deciduous Forests						
NA	2676	NA	No Federal Access				Gilpin silt loam, 5 to 12 percent slopes									Lowland or Submontaine Cold Deciduous Forests						
NA	8297	NA	No Federal Access				Gilpin silt loam, 5 to 12 percent slopes									Hemlock – White Pine Forest						
NA	1158	NA	No Federal Access	yes	311	Cliff Face	Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Mixed Pine – Oak Forest						
NA	1170	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Lowland or Submontaine Cold Deciduous Forests						
NA	1177	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony	yes	456	Perennial Stream	yes	466	R3RB2H, Riverine	yes	340	Mixed Pine – Oak Forest						
NA	1178	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Pine Forest						
NA	1187	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony							yes	367	Pine Forest						
NA	1190	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony							yes	192	Mixed Pine – Oak Forest						
NA	1213	NA	No Federal Access	yes	245	Cliff Face	Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony	yes	428	Perennial Stream	yes	400	R3RB2H, Riverine	yes	387	Successional Forest						
NA	1234	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony							yes	452	Successional Forest						
NA	1235	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Mixed Pine – Oak Forest						

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Big South Fork National River and Recreation Area (continued)																						
NA	1254	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Successional Forest						
NA	1257	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony	yes	395	Perennial Stream	yes	401	R3RB2H, Riverine	yes	216	Mixed Pine – Oak Forest						
NA	1284	NA	No Federal Access	yes	294	Cliff Face	Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony	yes	86	Perennial Stream	yes	58	R3RB2H, Riverine	yes	82	Hemlock – White Pine Forest						
NA	1309	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony	yes	206	Perennial Stream	yes	0	PSS1A, Freshwater Forested/ Shrub Wetland	yes	0	Lowland or Submontaine Cold Deciduous Forests						
NA	1391	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony	yes	218	Perennial Stream	yes	222	R3RB2H, Riverine	yes	17	Mixed Pine – Oak Forest						
NA	1480	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Hemlock – White Pine Forest						
NA	2096	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony									Hemlock – White Pine Forest						
NA	2156	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony	yes	397	Perennial Stream	yes	388	R3RB2H, Riverine	yes	319	Lowland or Submontaine Cold Deciduous Forests						
NA	2188	NA	No Federal Access	yes	115	Cliff Face	Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony	yes	494	Perennial Stream				yes	438	Hemlock – White Pine Forest						
NA	2979	NA	No Federal Access				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony	yes	374	Perennial Stream	yes	351	R3RB2H, Riverine	yes	301	Pine Forest						
NA	5229	NA	No Federal Access	yes	350	Cliff Face	Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony							yes	276	Mixed Pine – Oak Forest						
NA	1618	NA	No Federal Access				Gilpin-Petros complex, 20 to 35 percent slopes									Mixed Pine – Oak Forest						
NA	2472	NA	No Federal Access				Gilpin-Petros complex, 20 to 35 percent slopes									Hemlock – White Pine Forest						
NA	1111	NA	No Federal Access				Lily loam, 5 to 12 percent slopes				yes	133	PUBHh, Freshwater Pond			Successional Forest						

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Big South Fork National River and Recreation Area (continued)																						
NA	1487	NA	No Federal Access				Lily loam, 5 to 12 percent slopes									Herbaceous						
NA	1778	NA	No Federal Access				Lily loam, 5 to 12 percent slopes									Mixed Pine – Oak Forest						
NA	6085	NA	No Federal Access				Lily loam, 5 to 12 percent slopes									Hemlock – White Pine Forest						
NA	6769	NA	No Federal Access				Lily loam, 5 to 12 percent slopes									Hemlock – White Pine Forest						
NA	1194	NA	No Federal Access				Lily-Gilpin complex, 12 to 20 percent slopes	yes	399	Perennial Stream	yes	399	R3RB2H, Riverine	yes	293	Successional Forest						
NA	1283	NA	No Federal Access				Lily-Gilpin complex, 12 to 20 percent slopes									Mixed Pine – Oak Forest						
NA	1267	NA	No Federal Access	yes	495	Cliff Face	Lily-Gilpin complex, 5 to 12 percent slopes									Temporarily Flooded Forest						
NA	2019	NA	No Federal Access				Lily-Gilpin complex, 5 to 12 percent slopes									Successional Forest						
NA	1224	NA	No Federal Access	yes	43	Cliff Face	Lily-Ramsey complex, 12 to 20 percent slopes									Temporarily Flooded Forest						
NA	1345	NA	No Federal Access				Lily-Ramsey complex, 12 to 20 percent slopes	yes	260	Lake/Pond	yes	343	PUBHh, Freshwater Pond			Developed or Disturbed						
NA	1919	NA	No Federal Access				Lily-Ramsey complex, 12 to 20 percent slopes									Pine Forest						
NA	1449	NA	No Federal Access				Lily-Ramsey complex, 20 to 35 percent slopes									Pine Forest						
NA	1989	NA	No Federal Access				Pope-Skidmore complex, 0 to 4 percent slopes, frequently flooded							yes	194	Mixed Pine – Oak Forest						
NA	1363	NA	No Federal Access				Rock outcrop-Ramsey complex, 20 to 70 percent slopes									Pine Forest						
NA	1728	NA	No Federal Access				Shelocta silt loam, 12 to 20 percent slopes									Mixed Pine – Oak Forest						
NA	2048	NA	No Federal Access				Shelocta silt loam, 12 to 20 percent slopes							yes	487	Lowland or Submontaine Cold Deciduous Forests						
NA	1279	NA	No Federal Access				Wernock silt loam, 5 to 12 percent slopes									Successional Forest						
NA	1308	NA	No Federal Access				Wernock silt loam, 5 to 12 percent slopes									Mixed Pine – Oak Forest						

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Big South Fork National River and Recreation Area (continued)																						
NA	1317	NA	No Federal Access	yes	265	Cliff Face	Wernock silt loam, 5 to 12 percent slopes									Lowland or Submontaine Cold Deciduous Forests						
NA	1343	NA	No Federal Access				Wernock silt loam, 5 to 12 percent slopes									Mixed Pine – Oak Forest						

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Cuyahoga Valley National Park																						
Astorhurst #1	102-15	M&M Royalty	Access Exempt				Chili loam, 6 to 12 percent slopes									Developed, Open Space	yes	82.8	Polygon - Buildings	yes	82.8	Polygon - Buildings
Blossom No. 13	121-028-13	Moore Well Services	Access Exempt				Ellsworth silt loam, 12 to 25 percent slopes, moderately eroded	yes	145	Swamp/ Marsh						Pasture/Hay						
Cabala No. 1E	127-055-1	Petrox	Access Exempt				Oshtemo sandy loam, 25 to 55 percent slopes							yes	372	Deciduous Forest						
Cabala No. 2E	127-055-2	Petrox	Access Exempt				Chili loam, 0 to 2 percent slopes									Pasture/Hay						
Carper-Blossom #1	122-031	Moore Well Services	Access Exempt				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded									Evergreen Forest	yes	190.4	Polygon - Buildings	yes	190.4	Polygon - Buildings
Girl Scouts No. 5	110-017	Broad St. Energy	Access Exempt				Caneadea silt loam, 2 to 6 percent slopes				yes	445	unknown			Deciduous Forest	yes	247.7	Polygon-Buildings	yes	247.7	Polygon-Buildings
Hale Farm No. 2	120-035-2	Enervest Operating	Access Exempt				Ellsworth silt loam, 2 to 6 percent slopes									Deciduous Forest	yes	58.2	Line - Perkins Trail	yes	58.2	Line - Perkins Trail
Hale Farm No. 1	120-035-1	Enervest Operating	Access Exempt				Fitchville silt loam, 2 to 6 percent slopes				yes	484	unknown			Deciduous Forest	yes	188.1	Polygon - Buildings	yes	188.1	Polygon - Buildings
Hudkins No. 1	122-047-1	Moore Well Services	Access Exempt				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	yes	289	Lake/Pond	yes	315	unknown			Pasture/Hay	yes	64.3	Polygon - Buildings	yes	64.3	Polygon - Buildings
Hudkins No. 2	122-047-2	Moore Well Services	Access Exempt				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded									Pasture/Hay						
Hudkins No. 3	122-047-3	Moore Well Services	Access Exempt				Ellsworth silt loam, 12 to 25 percent slopes, moderately eroded				yes	321	unknown			Deciduous Forest						
KSU Foundation #1	122-047	Moore Well Services	Access Exempt				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded									Pasture/Hay						
Martin No. 1	116-026	Enervest Operating	Access Exempt				Rittman silt loam, 12 to 18 percent slopes, moderately eroded									Deciduous Forest	yes	478.5	Polygon - Buildings	yes	478.5	Polygon - Buildings
Myers No. 1	117-037	Moore Well Services	Access Exempt				Mahoning silt loam, 2 to 6 percent slopes									Pasture/Hay	yes	493.7	Polygon - Buildings	yes	493.7	Polygon - Buildings
Spieth No. 1L	127-066	Petrox	Access Exempt				Chili loam, 2 to 6 percent slopes	yes	357	Perennial Stream				yes	215	Deciduous Forest						

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Cuyahoga Valley National Park (continued)																						
Szalay No. 1	121-008-1	Moore Well Services	Access Exempt				Chagrin silt loam, alkaline	yes	277	Perennial Stream	yes	382	unknown	yes	0	Cultivated Crops	yes	96.7	Line - Valley Trail	yes	96.7	Line - Valley Trail
Szalay No. 2	121-008-2	Moore Well Services	Access Exempt				Chagrin silt loam, alkaline	yes	156	Perennial Stream	yes	308	unknown	yes	0	Pasture/Hay						
Wheatley No. 1	121-009-1	Moore Well Services	Access Exempt				Rough broken land, clay and silt				yes	270	unknown			Deciduous Forest						
Wheatley No. 2	121-009-2	Moore Well Services	Access Exempt				Rough broken land, clay and silt									Deciduous Forest	yes	440.3	Polygon - Buildings	yes	440.3	Polygon - Buildings
Wheatley No. 3	121-009-3	Moore Well Services	Access Exempt				Rough broken land, clay and silt									Deciduous Forest						
Wheatley No. 4	121-009-4	Moore Well Services	Access Exempt				Ellsworth silt loam, 6 to 12 percent slopes									Deciduous Forest						
Akron No. 11	116-057-11	City of Akron	Grandfathered				Chagrin silt loam, alkaline	yes	85	Perennial Stream	yes	291	unknown	yes	0	Deciduous Forest						
Akron No. 12	116-057-12	City of Akron	Grandfathered				Chagrin silt loam, alkaline	yes	232	Perennial Stream				yes	0	Deciduous Forest						
Akron No. 6	116-057-6	City of Akron	Grandfathered				Chagrin silt loam, alkaline	yes	354	Perennial Stream	yes	349	unknown	yes	108	Deciduous Forest						
Akron No. 7	116-057-7	City of Akron	Grandfathered				Chagrin silt loam, alkaline	yes	466	Perennial Stream	yes	454	unknown	yes	113	Deciduous Forest	yes	380.2	Line - Ohio & Erie Canal Towpath Trail	yes	380.2	Line - Ohio & Erie Canal Towpath Trail
Akron No. 8	116-057-8	City of Akron	Grandfathered				Chili silt loam, 2 to 6 percent slopes				yes	152	unknown			Developed, Low Intensity	yes	397.8	Line - Adam Run Trail	yes	397.8	Line - Adam Run Trail
Alright/Himmelright #1	117-030	Moore Well Services	Grandfathered				Glenford silt loam, 2 to 6 percent slopes									Pasture/Hay						
Armington No. 1	115-036	Enervest Operating	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded	yes	139	Lake/Pond	yes	426	unknown			Developed, Open Space						
Bender No. 1	121-062-1	Everflow Eastern	Grandfathered				Glenford silt loam, 0 to 2 percent slopes	yes	284	Perennial Stream	yes	268	unknown	yes	0	Pasture/Hay						
Bender No. 2	121-062-2	Everflow Eastern	Grandfathered				Chagrin silt loam, alkaline	yes	266	Perennial Stream	yes	483	unknown	yes	0	Grassland/Herbaceous	yes	422.9	Point - Monument	yes	422.9	Point - Monument
Bender No. 3	121-062-3	Everflow Eastern	Grandfathered				Fitchville silt loam, 0 to 2 percent slopes	yes	466	Perennial Stream	yes	403	unknown	yes	100	Deciduous Forest						
Blossom No. 1	121-028-1	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded				yes	134	unknown			Grassland/Herbaceous	yes	470.6	Polygon - Buildings	yes	470.6	Polygon - Buildings
Blossom No. 10	121-028-10	Moore Well Services	Grandfathered				Rough broken land, clay and silt				yes	383	unknown			Deciduous Forest						
Blossom No. 11	121-028-11	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes									Deciduous Forest						

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Cuyahoga Valley National Park (continued)																						
Blossom No. 12	121-028-12	Moore Well Services	Grandfathered				Rough broken land, clay and silt				yes	404	unknown			Deciduous Forest						
Blossom No. 2	121-028-2	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded				yes	302	unknown			Deciduous Forest						
Blossom No. 3	117-031	Moore Well Services	Grandfathered				Ellsworth silt loam, 2 to 6 percent slopes									Pasture/Hay	yes	10.6	Polygon - Buildings	yes	10.6	Polygon - Buildings
Blossom No. 4	121-028-4	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded									Deciduous Forest						
Blossom No. 5	121-028-5	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded									Deciduous Forest						
Blossom No. 6	121-028-6	Moore Well Services	Grandfathered				Geeburg silt loam, 2 to 6 percent slopes	yes	383	Lake/Pond	yes	316	unknown			Deciduous Forest						
Blossom No. 7	121-028-7	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded									Deciduous Forest						
Blossom No. 8	121-028-8	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded				yes	377	unknown			Deciduous Forest						
Blossom No. 9	121-028-9	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded									Deciduous Forest						
Bredenbeck No. 1	105-108	D&D Energy	Grandfathered				Chili silt loam, 0 to 2 percent slopes							yes	472	Deciduous Forest						
BSA No. 1	113-023-01	MFC Drilling	Grandfathered				Glenford silt loam, 12 to 18 percent slopes, moderately eroded				yes	149	unknown			Developed, Open Space	yes	298.1	Polygon - Buildings	yes	298.1	Polygon - Buildings
BSA No. 10	113-023-10	MFC Drilling	Grandfathered				Geeburg silt loam, 6 to 12 percent slopes, moderately eroded				yes	432	unknown			Developed, Open Space	yes	268.9	Polygon - Buildings	yes	268.9	Polygon - Buildings
BSA No. 11	113-023-11	MFC Drilling	Grandfathered				Geeburg silt loam, 6 to 12 percent slopes, moderately eroded				yes	238	unknown			Developed, Open Space	yes	432.5	Polygon - Buildings	yes	432.5	Polygon - Buildings
BSA No. 2	113-023-02	MFC Drilling	Grandfathered				Geeburg silt loam, 2 to 6 percent slopes				yes	305	unknown			Deciduous Forest	yes	364.5	Polygon - Buildings	yes	364.5	Polygon - Buildings
BSA No. 3	113-023-03	MFC Drilling	Grandfathered				Geeburg silt loam, 2 to 6 percent slopes									Deciduous Forest	yes	393.6	Polygon - Buildings	yes	393.6	Polygon - Buildings

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Cuyahoga Valley National Park (continued)																						
BSA No. 4	113-023-04	MFC Drilling	Grandfathered				Geeburg silt loam, 2 to 6 percent slopes	yes	290	Lake/Pond	yes	233	unknown			Evergreen Forest						
BSA No. 5	113-023-05	MFC Drilling	Grandfathered				Geeburg silt loam, 2 to 6 percent slopes									Deciduous Forest						
BSA No. 6	113-023-06	MFC Drilling	Grandfathered				Geeburg silt loam, 2 to 6 percent slopes	yes	398	Lake/Pond	yes	432	unknown			Developed, Open Space	yes	223.9	Polygon - Buildings	yes	223.9	Polygon - Buildings
BSA No. 7	113-023-07	MFC Drilling	Grandfathered				Geeburg silt loam, 2 to 6 percent slopes				yes	432	unknown			Developed, Open Space	yes	103.9	Polygon - Buildings	yes	103.9	Polygon - Buildings
BSA No. 8	113-023-08	MFC Drilling	Grandfathered				Glenford silt loam, 2 to 6 percent slopes				yes	470	unknown			Deciduous Forest	yes	78.4	Line - Camp Manatoc Connector	yes	78.4	Line - Camp Manatoc Connector
BSA No. 9	113-023-09	MFC Drilling	Grandfathered				Geeburg silt loam, 2 to 6 percent slopes	yes	288	Lake/Pond	yes	281	unknown			Evergreen Forest	yes	195.4	Polygon - Buildings	yes	195.4	Polygon - Buildings
Carter No. 1	113-050-1	Broad St. Energy	Grandfathered				Ellsworth-Urban land complex, undulating				yes	332	unknown			Grassland/Herbaceous						
Carter No. 2	113-050-2	Broad St. Energy	Grandfathered				Ellsworth silt loam, 2 to 6 percent slopes				yes	405	unknown			Deciduous Forest						
Everflow Eastern - CVNRA 1	116-016-1	Everflow Eastern	Grandfathered				Rough broken land, clay and silt				yes	493	unknown			Deciduous Forest	yes	327.1	Polygon - Buildings	yes	327.1	Polygon - Buildings
Everflow Eastern - CVNRA 2	116-016-2	Everflow Eastern	Grandfathered				Rittman silt loam, 6 to 12 percent slopes									Deciduous Forest						
Feathers No. 1	122-009	Moore Well Services	Grandfathered				Ellsworth silt loam, 2 to 6 percent slopes									Grassland/Herbaceous	yes	342.2	Polygon - Buildings	yes	342.2	Polygon - Buildings
Girl Scouts No. 1	110-035-1	Broad St. Energy	Grandfathered				Mahoning silt loam, 2 to 6 percent slopes				yes	65	unknown			Deciduous Forest	yes	492.8	Polygon - Buildings	yes	492.8	Polygon - Buildings
Girl Scouts No. 2	110-035-2	Broad St. Energy	Grandfathered				Mahoning silt loam, 2 to 6 percent slopes				yes	0	unknown			Deciduous Forest						
Haidnick No. 1	122-027	Moore Well Services	Grandfathered				Ellsworth silt loam, 12 to 25 percent slopes, moderately eroded									Pasture/Hay						
Johnson No. 1	109-071	Enervest Operating	Grandfathered				Ellsworth silt loam, 2 to 6 percent slopes									Developed, Low Intensity	yes	355.6	Line - Bike & Hike Trail	yes	355.6	Line - Bike & Hike Trail
Lebo No. 1	105-077	D&D Energy	Grandfathered				Fitchville silt loam, 2 to 6 percent slopes	yes	76	Lake/Pond	yes	212	unknown			Pasture/Hay						
LHK No. 3	108-007	Enervest Operating	Grandfathered				Ellsworth silt loam, 2 to 6 percent slopes									Deciduous Forest						

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Cuyahoga Valley National Park (continued)																							
Lombardo	126-045	Kurtz	Grandfathered				Euclid silt loam				yes	35	unknown	yes	290	Deciduous Forest							
Morgan/Ohio Ed #1	110-029	Broad St. Energy	Grandfathered				Ellsworth silt loam, 2 to 6 percent slopes				yes	198	unknown			Deciduous Forest	yes	233.3	Bike & Hike Trail	yes	233.3	Bike & Hike Trail	
Myers1/Somma-B2	117-038-1	Moore Well Services	Grandfathered				Ellsworth silt loam, 2 to 6 percent slopes									Pasture/Hay	yes	497.3	Polygon - Buildings	yes	497.3	Polygon - Buildings	
Parry No. 1	117-028-1	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded				yes	196	unknown			Cultivated Crops							
Parry No. 2	117-028-2	Moore Well Services	Grandfathered				Ellsworth silt loam, 12 to 25 percent slopes, moderately eroded									Cultivated Crops	yes	420.7	Polygon-Buildings	yes	420.7	Polygon-Buildings	
Peters No. 1	105-082	D&D Energy	Grandfathered				Bogart loam, 0 to 2 percent slopes				yes	431	unknown			Cultivated Crops							
Primm No. 1	117-029-1	Consortium Energy LLC	Grandfathered				Rough broken land, clay and silt				yes	422	unknown			Deciduous Forest	yes	490.0	Line - Adam Run Trail	yes	490.0	Line - Adam Run Trail	
Primm No. 2	117-029-2	Consortium Energy LLC	Grandfathered				Bogart loam, 2 to 6 percent slopes				yes	49	unknown			Deciduous Forest	yes	251.2	Polygon - Buildings	yes	251.2	Polygon - Buildings	
Primm No. 3	117-029-3	Consortium Energy LLC	Grandfathered				Chili silt loam, 6 to 12 percent slopes				yes	212	unknown			Deciduous Forest							
Quick Armington #1	115-037-1	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded									Grassland/Herbaceous	yes	286.8	Line - Buckeye Sports Connector	yes	286.8	Line - Buckeye Sports Connector	
Quick No. 2	115-037-2	Moore Well Services	Grandfathered				Ellsworth silt loam, 2 to 6 percent slopes									Shrub/Scrub	yes	118.4	Line - Cross Country Trail	yes	118.4	Line - Cross Country Trail	
Rosenlieb	124-024	Moore Well Services	Grandfathered				Rittman silt loam, 12 to 18 percent slopes, moderately eroded									Evergreen Forest	yes	52.4	Line - Plateau Trail	yes	52.4	Line - Plateau Trail	
Shaw No. 1	122-021	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes, moderately eroded									Deciduous Forest	yes	393.2	Polygon-Buildings	yes	393.2	Polygon-Buildings	
Somma-Buerger #1	117-038-2	Moore Well Services	Grandfathered				Ellsworth silt loam, 2 to 6 percent slopes									Pasture/Hay	yes	145.5	Polygon - Buildings	yes	145.5	Polygon - Buildings	
Szalay No. 3	121-004-3	Rosenlieb	Grandfathered				Conotton-Oshtemo complex, 25 to 50 percent slopes				yes	404	unknown			Deciduous Forest							
Szalay No. 4	121-004-4	Moore Well Services	Grandfathered				Tioga loam	yes	355	Perennial Stream	yes	460	unknown	yes	297	Cultivated Crop							
Thower/Talas #1	118-058	unknown. Ohio Ed?	Grandfathered				Udorthents	yes	493	Perennial Stream				yes	0	Deciduous Forest	yes	310.3	Polygon-Buildings	yes	310.3	Polygon-Buildings	

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Cuyahoga Valley National Park (continued)																						
Underwood No. 1	122-045-1	Moore Well Services	Grandfathered				Ellsworth silt loam, 6 to 12 percent slopes				yes	485	unknown			Developed, Open Space	yes	95.1	Polygon - Buildings	yes	95.1	Polygon - Buildings
Underwood No. 2	122-045-2	Moore Well Services	Grandfathered				Mahoning silt loam, 0 to 2 percent slopes	yes	201	Swamp/ Marsh	yes	420	unknown			Grassland/Herbaceous						
Underwood No. 3	122-045-3	Moore Well Services	Grandfathered				Ellsworth silt loam, 2 to 6 percent slopes	yes	484	Swamp/ Marsh	yes	305	unknown			Grassland/Herbaceous	yes	430.4	Polygon - Buildings	yes	430.4	Polygon - Buildings
Underwood No. 4	122-045-4	Moore Well Services	Grandfathered				Mahoning silt loam, 0 to 2 percent slopes	yes	341	Swamp/ Marsh	yes	346	unknown			Grassland/Herbaceous						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Gauley River National Recreation Area																						
NA	47-019-082	Rockhill Resources	Grandfathered				Clifftop channery silt loam, 25 to 35 percent slopes									Oak – Hickory – Sugar Maple Forest						
NA	47-019-359	Equitable Gas	Grandfathered				Clifftop channery silt loam, 3 to 8 percent slopes									Disturbed Area						
NA	47-019-380	Mike Ross	Grandfathered				Clifftop-Nallen complex, 8 to 15 percent slopes									Eastern Hemlock Plateau Forest						
NA	47-019-389	Equitable Gas	Grandfathered				Dekalb very channery loam, 3 to 15 percent slopes, extremely stony									Disturbed Area						
NA	47-019-393	Equitable Gas	Grandfathered				Laidig-Clifftop complex, 15 to 35 percent slopes, very stony									Disturbed Area						
NA	47-019-394-1	Equitable Gas	Grandfathered				Berks-Highsplint-Sharondale complex, 35 to 80 percent slopes, very stony									Road						
NA	47-019-394-2	Equitable Gas	Grandfathered				Laidig-Clifftop complex, 15 to 35 percent slopes, very stony									Disturbed Area						
NA	47-019-452	Texas Int. Petroleum	Grandfathered				Clifftop channery silt loam, 8 to 15 percent slopes									Eastern Hemlock – Oak – Sweet Birch / Great Laurel Forest						
NA	47-067-052	Equitable Gas	Grandfathered				Highsplint channery loam, 15 to 35 percent slopes, very stony									Developed Area						
NA	47-067-091	Equitable Gas	Grandfathered				Berks-Highsplint-Sharondale complex, 35 to 80 percent slopes, very stony							yes	91	Oak – Hickory – Sugar Maple Forest						
NA	47-067-119	Equitable Gas	Grandfathered				Clifftop channery silt loam, 25 to 35 percent slopes									Developed Area						
NA	47-067-254	Equitable Gas	Grandfathered				Berks-Highsplint-Sharondale complex, 35 to 80 percent slopes, very stony	yes	195	Perennial Stream	yes	221	R3UBH, Riverine	yes	175	Oak – Hickory – Sugar Maple Forest						
NA	47-067-418	Equitable Gas	Grandfathered				Clifftop channery silt loam, 8 to 15 percent slopes									Road						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Gauley River National Recreation Area (continued)																						
NA	47-067-471	Cities Service	Grandfathered				Laidig-Clifftop complex, 15 to 35 percent slopes, very stony									Developed Area						
NA	47-067-474	Equitable Gas	Grandfathered				Nallen loam, 8 to 15 percent slopes									Developed Area						
NA	47-067-475	Equitable Gas	Grandfathered				Dekalb-Rock outcrop complex, 15 to 35 percent slopes, extremely stony									Disturbed Area						
NA	47-067-511	Equitable Gas	Grandfathered				Clifftop channery silt loam, 3 to 15 percent slopes, very stony									Developed Area						
NA	47-067-512	Equitable Gas	Grandfathered				Lily loam, 8 to 15 percent slopes									Eastern Hemlock Plateau Forest						
NA	47-067-5157	Equitable Gas	Grandfathered				Berks-Highsplint-Sharondale complex, 35 to 80 percent slopes, very stony									Oak – Hickory – Sugar Maple Forest						
NA	47-067-655	Equitable Gas	Grandfathered				Berks-Highsplint-Sharondale complex, 35 to 80 percent slopes, very stony									Oak – Hickory Forest						
NA	47-067-656	Equitable Gas	Grandfathered				Clifftop channery silt loam, 25 to 35 percent slopes									Developed Area						
NA	47-067-657	Equitable Gas	Grandfathered				Clifftop channery silt loam, 25 to 35 percent slopes									Road						
NA	47-067-743	Equitable Gas	Grandfathered				Clifftop channery silt loam, 3 to 8 percent slopes									Developed Area						
NA	47-067-771	Equitable Gas	Grandfathered				Berks-Highsplint-Sharondale complex, 35 to 80 percent slopes, very stony									Developed Area						
NA	47-067-782	Equitable Gas	Grandfathered				Layland-Rock outcrop complex, 35 to 70 percent slopes, very rubbly	yes	271	Perennial Stream	yes	220	R3RSA, Riverine	yes	68	Developed Area						
NA	47-067-788	Equitable Gas	Grandfathered				Clifftop channery silt loam, 25 to 35 percent slopes	yes	498	Perennial Stream				yes	468	Road						
NA	47-067-789	Equitable Gas	Grandfathered				Berks-Highsplint-Sharondale complex, 35 to 80 percent slopes, very stony									Developed Area						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Gauley River National Recreation Area (continued)																						
NA	47-067-792	Equitable Gas	Grandfathered				Dekalb-Rock outcrop complex, 15 to 35 percent slopes, extremely stony									Developed Area						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Lake Meredith National Recreation Area																						
Barnes State 1	024445	Burnett	Grandfathered				Yomont soils, frequently flooded	yes	0	Inundation Area	yes	151	R4SBA, Riverine	yes	0	Oil/Gas Development Sites						
Barnes State 1R	027148	Burnett	Grandfathered				Yomont soils, frequently flooded	yes	0	Inundation Area	yes	123	R4SBA, Riverine	yes	0	Oil/Gas Development Sites						
Bivins 1	024745	Phillips	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep	yes	37	Inundation Area						Upland Slopes/Rolling Hills Vegetation Complex						
Bivins 2	024606	Oilwell Operators	Grandfathered	yes	49	Caprock Polygon	Burson stony loam, steep	yes	229	Inundation Area	yes	409	L1UBHh, Lake			Transportation						
Bivins 5-R	027251	Lera	Grandfathered				Dallam fine sandy loam, 1 to 3 percent slopes									Blue Grama-Buffalograss Herbaceous Vegetation						
Bivins HH-2	034056	Phillips	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep	yes	85	Inundation Area	yes	301	PEM1/SS1Ch, Freshwater Emergent Wetland			Upland Slopes/Rolling Hills Vegetation Complex						
Cecil 2	024783	Phillips	Grandfathered	yes	153	Caprock Polygon	Tascosa gravelly loam, 3 to 20 percent slopes	yes	12	Inundation Area						Upland Slopes/Rolling Hills Vegetation Complex						
D-Jay 2	027221	Phillips	Grandfathered	yes	33	Caprock Polygon	Tascosa gravelly loam, 3 to 20 percent slopes									Upland Slopes/Rolling Hills Vegetation Complex						
E L Snow 10	027239	Phillips	Grandfathered	yes	285	Caprock Polygon	Mobeetie fine sandy loam, 5 to 12 percent slopes	yes	446	Inundation Area						Honey Mesquite Shrubland Complex						
E L Snow 13	034468	Phillips	Grandfathered	yes	386	Caprock Polygon	Mobeetie fine sandy loam, 5 to 12 percent slopes									Honey Mesquite Shrubland Complex						
E L Snow 14	034469	Phillips	Grandfathered	yes	0	Caprock Polygon	Dallam fine sandy loam, 1 to 3 percent slopes	yes	264	Inundation Area						Honey Mesquite Shrubland Complex						
E L Snow 8	027237	Phillips	Grandfathered	yes	116	Caprock Polygon	Dallam fine sandy loam, 1 to 3 percent slopes	yes	481	Inundation Area						Honey Mesquite Shrubland Complex						
EL Snow 7	027236	Phillips	Grandfathered	yes	229	Caprock Polygon	Mobeetie and Veal soils, 5 to 20 percent slopes	yes	318	Inundation Area						Upland Slopes/Rolling Hills Vegetation Complex						
Evelyn 1	024845	Phillips	Grandfathered				Borrow pit									Strip Mines, Quarries, and Borrow Areas						
Evelyn 2	027215	Phillips	Grandfathered				Dallam fine sandy loam, 1 to 3 percent slopes	yes	188	Inundation Area						Strip Mines, Quarries, and Borrow Areas						
H Sneed 1	023673	Herrmann, JB	Grandfathered	yes	92	Caprock Polygon	Enterprise very fine sandy loam, 5 to 8 percent slopes	yes	0	Inundation Area						Honey Mesquite Shrubland Complex						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Lake Meredith National Recreation Area (continued)																						
H Sneed 1-RC	035141	Herrmann, J B	Grandfathered	yes	0	Caprock Polygon	Enterprise very fine sandy loam, 5 to 8 percent slopes	yes	0	Inundation Area						Upland Slopes/Rolling Hills Vegetation Complex						
Ingerton A-1	024919	Phillips	Grandfathered	yes	8	Caprock Polygon	Dallam fine sandy loam, 1 to 3 percent slopes	yes	6	Inundation Area	yes	358	PUSAh, Freshwater Pond			Upland Slopes/Rolling Hills Vegetation Complex						
Ingerton A-2	024920	Phillips	Grandfathered				Likes loamy fine sand, 1 to 6 percent slopes									Honey Mesquite Shrubland Complex						
J Williams 1	025210	Phillips	Grandfathered	yes	80	Caprock Polygon	Burson stony loam, steep	yes	106	Inundation Area						Upland Slopes/Rolling Hills Vegetation Complex						
J Williams 2	027244	Phillips	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep	yes	0	Inundation Area	yes	146	PSS1Ch, Freshwater Forested/ Shrub Wetland			Strip Mines, Quarries, and Borrow Areas						
Kermicle 3	034998	Phillips	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep	yes	166	Inundation Area	yes	325	L2USAh, Lake			Mixed Urban-Built-up Land						
Kermicle 4	034862	Phillips	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep	yes	159	Inundation Area	yes	304	L2USAh, Lake			Mixed Urban-Built-up Land						
McMann 2	025038	Phillips	Grandfathered				Dallam-Urban land complex, 0 to 3 percent slopes									Honey Mesquite Shrubland Complex						
McMann 3	076437	Phillips	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep				yes	229	PFO1/ SS1A, Freshwater Forested/ Shrub Wetland			Steep Slope Vegetation Complex						
Phillips Eagle 2	074860	Phillips	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep	yes	0	Inundation Area	yes	307	PEM1/ SS1Ch, Freshwater Emergent Wetland			Upland Slopes/Rolling Hills Vegetation Complex						
Record-B 1	025093	Phillips	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep	yes	0	Inundation Area	yes	24	PEM1/ SS1Ch, Freshwater Emergent Wetland			Steep Slope Vegetation Complex						
Red Cave A1	027232	Phillips	Grandfathered				Dallam fine sandy loam, 1 to 3 percent slopes									Upland Slopes/Rolling Hills Vegetation Complex						
Sneed 2R	027255	Lera	Grandfathered	yes	0	Caprock Polygon	Rough broken land	yes	0	Inundation Area	yes	238	PSS1/2Ah, Freshwater Forested/ Shrub Wetland			Sand Sagebrush/(Sideouts Grama, Hairy Grama) Shrubland						
Sneed F 2	027234	Phillips	Grandfathered	yes	251	Caprock Polygon	Enterprise very fine sandy loam, 5 to 8 percent slopes	yes	0	Inundation Area						Sand Sagebrush/(Sideouts Grama, Hairy Grama) Shrubland						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Lake Meredith National Recreation Area (continued)																						
State 8-A	024637	Huber	Grandfathered	yes	82	Caprock Polygon	Burson stony loam, steep	yes	211	Inundation Area						Upland Slopes/Rolling Hills Vegetation Complex						
State A-10A	034543	Huber	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep	yes	0	Inundation Area	yes	253	L1UBHh, Lake			Steep Slope Vegetation Complex						
State A-38A	024639	Huber	Grandfathered				Lincoln soils				yes	489	PEM1F, Freshwater Emergent Wetland			Mixed Urban-Built-up Land						
State A-60R	034547	Huber	Grandfathered	yes	434	Caprock Polygon	Burson stony loam, steep	yes	0	Lake Meredith	yes	78	PSS1Ch, Freshwater Forested/Shrub Wetland			Drawdown Areas						
State A-61R	027212	Huber	Grandfathered	yes	233	Caprock Polygon	Tascosa gravelly loam, 3 to 20 percent slopes	yes	160	Inundation Area						Upland Slopes/Rolling Hills Vegetation Complex						
State A-62RC	027213	Huber	Grandfathered				Lincoln soils	yes	445	Lake/Pond						Perennial Bottomland/Upper Terrace/Valley Floor HV Complex						
State A-9A	034542	Huber	Grandfathered	yes	423	Caprock Polygon	Burson stony loam, steep	yes	0	Lake Meredith	yes	88	PSS1Ch, Freshwater Forested/Shrub Wetland			Drawdown Areas						
Williams C-2	023950	Huber	Grandfathered	yes	335	Caprock Polygon	Burson stony loam, steep	yes	349	Inundation Area						Sand Sagebrush/(Sideouts Grama, Hairy Grama) Shrubland						
Williams C-4R	027133	Huber	Grandfathered				Mobeetie fine sandy loam, 5 to 12 percent slopes									Honey Mesquite Shrubland Complex						
Williams-C 5AR	034861	Huber	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep	yes	0	Inundation Area	yes	114	L2USAh, Lake			Steep Slope Vegetation Complex						
Williams-C A3	034997	Huber	Grandfathered	yes	0	Caprock Polygon	Burson stony loam, steep	yes	0	Inundation Area	yes	133	L2USAh, Lake			Sand Sagebrush/(Sideouts Grama, Hairy Grama) Shrubland						

Well Name	Unique ID	Well Operator	Reg Status	Sensitive Geologic Features within 500 feet	Distance to Sensitive Geologic Feature (feet)	Closest Geologic Feature	Soil Type (Hydric Soil indicated in bold)	Surface Water Bodies within 500 feet	Distance to the Surface Water Body (feet)	Closest Surface Water Body	Wetlands within 500 feet	Distance to Wetland (feet)	Closest Wetland	100-yr Floodplains within 500 feet	Distance to Flood Zone (feet)	Vegetation Cover Type	Visitor Use Areas within 500 feet	Distance to Visitor Use Area	Closest Visitor Use Area	Cultural Areas within 500 feet	Distance to Cultural Area	Closest Cultural Area
Aztec Ruins National Monument																						
Bobbie Herrera #1	NA-AZRU	Manana Gas Inc	Grandfathered				Haplargids-Blackston-Torriorhents complex, very steep									Unknown						
Big Thicket National Preserve																						
3	19900176	Premium Exploration Company	No Federal Access				Belrose-Caneyhead complex, 0 to 1 percent slopes	yes	39	Jack Gore Baygall	yes	107	PSS1F, Freshwater Forested/Shrub Wetland	yes	0	Lower Slope Hardwood Pine/Wetland Shrub Baygall Thicket						
1-A	19930787	Premium Exploration Company	No Federal Access				Belrose-Caneyhead complex, 0 to 1 percent slopes	yes	0	Swamp/Marsh	yes	55	PFO1A, Freshwater Forested/Shrub Wetland	yes	0	Lower Slope Hardwood Pine/Wetland Shrub Baygall Thicket						
Cumberland Gap National Historic Park																						
NA	NA-CUGA1	Daugherty	Grandfathered				Muskingum stony fine sandy loam (st-l)									Unknown						
NA	NA-CUGA2	Daugherty	Grandfathered				Muskingum stony fine sandy loam (st-l)									Unknown						
New River Gorge National River																						
BERWIND 2	1900155	BERWIND OIL & GAS INC	Grandfathered				Cookport-Nallen complex, 3 to 8 percent slopes	yes	471	Lake/Pond						Oak / Ericad Forest						
Obed Wild and Scenic River																						
Marsh #5	0006708	TexFlora Energy Corporation	Access Exempt				Gilpin silt loam, 12 to 20 percent slopes									Upland Mixed Evergreen/Deciduous Forest						
Plateau Properties #1	0003754	Tanasi Oil and Gas, Inc.	Grandfathered				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony	yes	308	Riverine Wetland	yes	308	R3RB2H, Riverine	yes	279	Upland Deciduous Forest	yes	308.4	Polygon - River			
Plateau Properties #5	0004770	Tanasi Oil and Gas, Inc.	Grandfathered				Gilpin-Petros complex, 20 to 35 percent slopes							yes	479	Upland Mixed Evergreen/Deciduous Forest						
Robinson #1	0003499	Tanasi Oil and Gas, Inc.	Grandfathered				Gilpin-Bouldin-Petros complex, 25 to 80 percent slopes, very stony							yes	440	Mixed Urban-Built-up Land						
Robinson #6	0008319	Tanasi Oil and Gas, Inc.	Grandfathered				Lily-Gilpin complex, 12 to 20 percent slopes	yes	423	Riverine Wetland	yes	423	R3RB2H, Riverine	yes	308	Upland Deciduous Forest	yes	422.5	Polygon - River			

Sources for well-specific information reported here include NPS geospatial data obtained through outreach to individual park unit resource specialists and supplemental information received from the Geologic Resources Division. These files may be found in the administrative record. Note that information presented in this matrix is derived from analysis of geospatial data and may not coincide with data presented in well inspection reports.

**APPENDIX D: SITE INSPECTION INFORMATION FOR
CURRENT ACCESS-EXEMPT AND GRANDFATHERED WELLS**

WELL SITE CONDITIONS SUMMARY FOR CATEGORY 1 PARK UNITS WITH EXEMPT OPERATIONS

Park Unit	Number of Grandfathered / Access-Exempt Operations	Documented Occurrences of On-Site Contamination	Relative Risk of Potential Contamination	Description / Notes
Gauley River National Recreation Area	28 / 0	No	Low	Soil contamination was not identified as an issue at any well site. Chemicals are not typically used in the production process for gas wells.
Big South Fork National River and Recreation Area	98 / 54	Yes	High for some wells	<p>During reclamation of 53 wells, approximately 10% of the sites were found as warranting further action based on surface and subsurface investigations. Contamination included: staining at the wellheads; notable hydrocarbon odors; lack of or other effects on vegetation; and elevated subsurface background levels for hydrocarbons.</p> <p>Formal site inspections have been conducted over the last few years. Review of 122 site inspection reports revealed 30 sites with signs of soil contamination, leaking wellheads, or gas odors. Information was also noted regarding the presence of sensitive resources:</p> <ul style="list-style-type: none"> • 8 sites with wellhead leaks: Hurricane Ridge #1591; Hurricane Ridge #2361; Joe's Branch #1453; Joe's Branch #2198; Peter's Bridge #4658; Peter's Bridge #5975; Rugby #4930; and Sheep Ranch #562 • 14 sites with spills and contamination associated with operation and maintenance of the sites: Grassy Knob #1177; Hurricane Ridge #1343; Hurricane Ridge #1371; Hurricane Ridge #6744; Hurricane Ridge #6769; Hurricane Ridge #8437; Peter's Bridge #4658; Sheep Ranch #443; Sheep Ranch #467; Sheep Ranch #560; Silcox Ford #1224; Silcox Ford #1267; Silcox Ford #1363; and Silcox Ford #2979 • 2 sites with noises emanating from the well pad equipment: Hannah Davidson #6399 and Station Camp #6107 • 10 sites with notable hydrocarbon odors emanating from wellhead locations: Hannah Davidson #7313; Honey Creek #1548; Hurricane Ridge #2361; Long Ridge #1977; Peter's Bridge #4657; Rugby #4930; Silcox Ford #1317; Station Camp #3046; Station Camp #6107; and Tar Kiln Trail #5859 • 1 site with a tank battery leak: Sheep Ranch #5495 • 1 site with a pump jack leak: Hurricane Ridge #1371 • 13 sites with sensitive species or habitat: Silcox Ford #1224; Silcox Ford #2979; Silcox Ford #1170; Silcox Ford #1178; Silcox Ford #1187; Silcox Ford #1194; Silcox Ford #1213; Silcox Ford #1234; Silcox Ford #1235; Silcox Ford #1284; Silcox Ford #1309; Silcox Ford #2156; and Silcox Ford #5229 • 28 sites were associated with wetlands and floodplain resources (10 with floodplains specifically noted): Brewster Bridge #5989; Brewstertown #3297;

Appendix D: Site Inspection Information for Current Access-exempt and Grandfathered Wells

Park Unit	Number of Grandfathered / Access-Exempt Operations	Documented Occurrences of On-Site Contamination	Relative Risk of Potential Contamination	Description / Notes
				Grassy Knob #1257; Grassy Knob #1391; Hannah Davidson #6602; Hurricane Ridge #2190; Peter's Bridge #4658; Peter's Bridge #1622; Peter's Bridge #5975; Rugby #4830; Rugby #6881; Shirley #4909; Shirley #5782; Shirley #6255; Silcox Ford #2979; Silcox Ford #1170; Silcox Ford #1178; Silcox Ford #1187; Silcox Ford #1194; Silcox Ford #1213; Silcox Ford #1234; Silcox Ford #1235; Silcox Ford #1284; Silcox Ford #1309; Silcox Ford #2156; Silcox Ford #5229; Silcox Ford #1158; and Station Camp #3046 • 6 sites were associated with cultural resources: Hurricane Ridge #2190; Long Ridge #1872; Peter's Bridge #3571; Peter's Bridge #3570; Peter's Bridge #4244; and Station Camp #6107
Obed Wild and Scenic River	4 / 1	Yes	Medium	Contamination included elevated levels of hydrocarbons in pits and wellhead staining.
Aztec Ruins National Monument	1 / 0	No	Low	One gas well. Records of inspections following cleanup and remediation of drilling pits reveal no reports of contamination.
New River Gorge National River	1 / 0	No	Low	No contamination. Well was never produced. Inspections did not encounter contamination.
Lake Meredith National Recreation Area	41 / 0	Yes	High for some wells	Mix of oil and gas wells. History of incidences with oil wells (which are contained primarily within one area of the unit) includes flow line breaks; tank spills; and staining due to lack of secondary containment. Site inspection data is dated and no current information is available.
Cumberland Gap National Historical Park	2 / 0	No	Low	No formal site inspections. Gas wells (likely air drilled) are located at top of Fern Lake. No liquid storage on site.
Big Thicket National Preserve	2 / 0	Yes	High	Oil well and salt water disposal well. Risk is high for both oil and brine contamination. Site inspections reveal history of contamination, including: leaks; operator practices such as lack of secondary containment leading to contamination; and mechanical problems associated with the injection system.

Appendices

Park Unit	Number of Grandfathered / Access-Exempt Operations	Documented Occurrences of On-Site Contamination	Relative Risk of Potential Contamination	Description / Notes
Cuyahoga Valley National Park	66 / 21	Yes	High for some wells	<p>Mix of oil and gas wells. History of incidences with oil wells, mostly shallow gas wells. Formal site inspections have been conducted over the last few years. Review of 41 site inspection reports revealed 25 sites with signs of soil contamination, leaking wellheads, or gas odors. Information was also noted regarding the presence of sensitive resources:</p> <ul style="list-style-type: none"> • 16 sites with wellhead leaks: Akron #12; Armington #1; Carter #1; Carter #2; Coonrad #2; CVNRA #1; CVNRA #2; Girl Scouts (GSA) #2; Haidnick #1; LHK #3; Lombardo #1; Peters #1; Quick-Armington #1; Shaw #1; Underwood #1; Underwood #3; and Underwood #4 • 5 sites with spills and contamination associated with operation and maintenance of the sites: CVNRA #2; Girl Scouts (GSA) #2; Parry #1; Parry #2; and Underwood #3 • 4 sites with noises emanating from the well pad equipment: Lombardo #1; Carter #2; Coonrad #2; CVNRA #1 • 4 sites with notable hydrocarbon odors emanating from wellhead, tank battery, or pump jack locations: Carter #2; Lombardo #1; Morgan-OH Edison #1; Peters #1; 11 sites with a tank battery leak: Armington #1; Carter #1; Carter #2; CVNRA #1; CVNRA #2; Girl Scouts (GSA) #1; Girl Scouts (GSA) #2; Haidnick #1; Himelright #1; Johnson #1; Morgan-OH Edison #1 • 1 site with a pump jack leak: Quick-Armington #1 • 11 sites with tank battery leaks: Armington #1, Carter #1, Carter #2, CVNRA #1, CVNRA #2, Girl Scouts (GSA) #1, Girl Scouts (GSA) #2, Haidnick #1, Himelright #1, Johnson #1, Morgan-OH Edison #1 • 2 sites with sensitive species or habitat: Blossom #3; Himelright #1

Sources: O'Dell pers. comm. 2013a and site inspection reports provided by CUVA and BISO. These files may be found in the administrative record.

WELL SITE CONDITIONS FOR EXEMPT WELLS AT CUYAHOGA VALLEY NATIONAL PARK FROM OIL AND GAS WELL INSPECTIONS (2006)

Well	Exemption Status	Wellhead Leaks	Wellhead Odor	Battery Leaks	Battery Odor	Pump Leaks	Pump Odor	Pipeline Leaks	Spills	Noise	Sensitive Species	Other
Akron #11	GF											Invasive plants
Akron #12	GF	Y										Sludge coming from wellhead; invasive plants
Akron #6	GF											Standing water; invasive plants
Akron #7	GF											Invasive plants
Akron #8	GF											Invasive plants
Armington #1	GF	Y		Y								Bubbling at wellhead
Bender #1	GF											
Bender #2	GF											Invasive plants
Bender #3	GF											Standing water in tank battery area
Blossom #3	GF										Y	Bobolink - state species of concern; eastern meadowlark listed on report but only western meadowlark is listed as state species of interest
Bredenbeck #1	GF											
Carter #1	GF	Y		Y								
Carter #2	GF	Y	Y	Y						Y		Bubbling at wellhead; semi-explosive noise at wellhead
CVNRA #1	GF	Y		Y						Y		Noise at wellhead
CVNRA #2	GF	Y		Y					Y			Small spill
Feathers #1	GF							Y				
Girl Scouts (GSA) #1	GF			Y								

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Well	Exemption Status	Wellhead Leaks	Wellhead Odor	Battery Leaks	Battery Odor	Pump Leaks	Pump Odor	Pipeline Leaks	Spills	Noise	Sensitive Species	Other
Girl Scouts (GSA) #2	GF	Y		Y					Y			Oil pooled at tank removal site
Haidnick #1	GF	Y		Y								Invasive plants
Himelright #1	GF			Y				Y			Y	Bobolink - state species of concern; eastern meadowlark listed on report but only western meadowlark is listed as state species of interest
Johnson #1	GF			Y								Heavy tank battery leaking
Lebo No. 1	GF											Rusty tanks; access roads cause flooding
LHK #3	GF	Y										Bubbling at wellhead; invasive plants
Lombardo #1	GF	Y	Y							Y		Bubbles and odor at wellhead; running water noise; invasive plants
Morgan-OH Edison #1	GF		Y	Y								Wellhead cup standing wide open
Parry #1	GF								Y			Vegetation along access road oil covered
Parry #2	GF								Y			Vegetation along access road oil covered
Peters #1	GF	Y	Y									Bubbles and odor at wellhead
Primm #1	GF											
Primm #2	GF											
Primm #3	GF											
Quick #2	GF				Y							
Quick-Armington #1	GF	Y			Y	Y	Y					

Appendix D: Site Inspection Information for Current Access-exempt and Grandfathered Wells

Well	Exemption Status	Wellhead Leaks	Wellhead Odor	Battery Leaks	Battery Odor	Pump Leaks	Pump Odor	Pipeline Leaks	Spills	Noise	Sensitive Species	Other
Shaw #1	GF	Y										Invasive plants
Somma-Buergler #1	GF											
Somma-Buergler #2	GF				Y							
Szalay #4	GF											
Underwood #1	GF	Y										Notes of site were on back of scan - not available
Underwood #2	GF											Invasive plants
Underwood #3	GF	Y							Y			Spill at pump; standing water; invasive plants
Underwood #4	GF	Y										Invasive plants

Status: GF = Grandfathered; NFA = No Federal Access

**WELL SITE CONDITIONS FOR EXEMPT WELLS AT BIG SOUTH FORK NATIONAL RIVER AND RECREATION AREA FROM OIL AND GAS WELL INSPECTIONS
(2006)**

Well Permit Number	Exemption Status	Wellhead Leaks	Wellhead Odor	Battery Leaks	Pump Leaks	Spills	Noise	Sensitive Species	Wetlands	Sensitive Cultural	Other
3589	GF										Invasive plants
5989	GF								Y		Wetlands
3297	GF								Y		Floodplain/ravine
3234	GF										
6036	GF										
6037	GF										
1257	NFA								Y		Wetlands and floodplain; stream and flooding hazard
1391	NFA								Y		Wetlands and floodplain; flooding hazard
1177	NFA					Y					Slight soil contamination during well configuration activities
1283	NFA										
6602	GF								Y		Wetlands; drainage
6399	GF						Y				Gas vibration noise from production lines
7313	GF		Y								Wellhead gas odor
3323	GF										
6356	GF										
6519	GF										
1548	GF		Y								Wellhead gas visually venting from flowline
822	GF										
3868	GF										

Appendix D: Site Inspection Information for Current Access-exempt and Grandfathered Wells

Well Permit Number	Exemption Status	Wellhead Leaks	Wellhead Odor	Battery Leaks	Pump Leaks	Spills	Noise	Sensitive Species	Wetlands	Sensitive Cultural	Other
2190	GF								Y	Y	Floodplain and adjacent to rock shelter; examined and determined negative findings
2361	GF	Y	Y								Wellhead valve leak with strong gas odor
1677	GF										
1951	GF										
2037	GF										
2593	GF										
2856	GF										
1343	NFA					Y					Oil on ground 50 sq. ft.
1371	NFA				Y	Y					Oil on ground 30 sq. ft.; pumpline leak
6744	NFA					Y					Oil on ground 2 sq. ft.
6769	NFA					Y					Most of wellpad is covered in heavy oil, sheen
8437	GF					Y					Oil stain/trail running into woods 80 sq. ft.
1591	NFA	Y									Dried oil on wellhead
1308	NFA										
1449	NFA										
1475	NFA										
1487	NFA										
1509	NFA										
1522	NFA										
1618	NFA										

Appendices

Well Permit Number	Exemption Status	Wellhead Leaks	Wellhead Odor	Battery Leaks	Pump Leaks	Spills	Noise	Sensitive Species	Wetlands	Sensitive Cultural	Other
1997	NFA										
2472	GF										
2706	GF										
6880	NFA										
8297	NFA										
8541	GF										
8559	GF										
1453	GF	Y									
2198	GF	Y									Casing head gas venting
1504	GF										
4372	GF										
4496	GF										
4991	GF										
5037	GF										
5092	GF										
5148	GF										
6993	GF										
7108	GF										
1872	GF									Y	Potential site - corral- with large outcrop and split rail fence
1977	GF		Y								Venting gas
1762	GF										
2118	GF										
2167	GF										
5958	GF										

Appendix D: Site Inspection Information for Current Access-exempt and Grandfathered Wells

Well Permit Number	Exemption Status	Wellhead Leaks	Wellhead Odor	Battery Leaks	Pump Leaks	Spills	Noise	Sensitive Species	Wetlands	Sensitive Cultural	Other
7645	GF										
4658	GF	Y				Y			Y		Wetland 400 ft from wellhead, oil on ground 4 sq. ft. at wellhead
1622	GF								Y		Wetland drainage 100 ft from wellhead
5975	GF	Y							Y		Wetland 400 ft from wellhead, oil on ground 300 sq. ft. at wellhead
3571	GF									Y	Flint scatter on access road
4657	GF		Y								
3570	GF									Y	Flint scatter on access road
4244	GF									Y	Flint scatter on access road
5789	GF										
4830	GF								Y		Floodplain on bluff
6881	GF								Y		Wetlands and floodplain
4930	GF	Y	Y								
2070	GF										
2123	GF										
4831	GF										
443	GF					Y					3 sq. ft. water contamination
467	GF					Y					3 sq. ft. soil contamination outside berm
560	GF					Y					9 sq. ft. contamination inside berm
5495	GF			Y							Unsecured tank
562	GF	Y									2 sq. ft. contamination at wellhead
435	GF										
531	GF										

Appendices

Well Permit Number	Exemption Status	Wellhead Leaks	Wellhead Odor	Battery Leaks	Pump Leaks	Spills	Noise	Sensitive Species	Wetlands	Sensitive Cultural	Other
579	GF										
6924	GF										
4909	GF								Y		Floodplain
5782	GF								Y		Floodplain
6255	GF								Y		Floodplain
1376	GF										
1403	GF										
5752	GF										
2979	NFA					Y		Y	Y		2,000 sq. ft. oil contamination; wetland river; sensitive habitat present
1170	NFA							Y	Y		Wetland stream; sensitive habitat present
1178	NFA							Y	Y		Wetland stream; sensitive habitat present
1187	NFA							Y	Y		Wetland; sensitive habitat present
1194	NFA							Y	Y		Wetland river; sensitive habitat present
1213	NFA							Y	Y		Wetland river; sensitive habitat present
1234	NFA							Y	Y		Wetland stream; sensitive ledge habitat present
1235	NFA							Y	Y		Wetland river; sensitive ledge habitat present
1284	NFA							Y	Y		Wetland river and floodplain; sensitive habitat present

Appendix D: Site Inspection Information for Current Access-exempt and Grandfathered Wells

Well Permit Number	Exemption Status	Wellhead Leaks	Wellhead Odor	Battery Leaks	Pump Leaks	Spills	Noise	Sensitive Species	Wetlands	Sensitive Cultural	Other
1309	NFA							Y	Y		Wetland river and floodplain; sensitive habitat present
2156	NFA							Y	Y		Wetland river; sensitive habitat present
5229	NFA							Y	Y		Wetland river; sensitive habitat present
1158	NFA								Y		Wetland stream
1224	NFA					Y		Y			Spur above river; 2 sq. ft. oil contamination
1267	NFA					Y					2 sq. ft. oil contamination at wellhead
1363	NFA					Y					3 sq. ft. oil contamination
1317	NFA		Y								
1111	NFA										
1190	NFA										
1279	NFA										
8706	GF										
1254-1	NFA										
3046	GF		Y						Y		Wetland marsh
6107	GF		Y				Y			Y	Cemetery adjacent to access road
4747	GF										
6108	GF										
7082	GF										
5859	GF		Y								
8346	GF										

Status: GF = Grandfathered; NFA = No Federal Access

Appendices

APPENDIX E: FEDERALLY LISTED SPECIAL STATUS SPECIES OCCURRING IN CATEGORY 1 AND CATEGORY 2 PARK UNITS

Park Unit	Species Type	Common Name	Scientific Name	Listing Status
Category 1 Park Units				
Lake Meredith and Alibates Flint Quarries	Mammals	Black-footed Ferret	<i>Mustela nigripes</i>	E
	Birds	Interior Least Tern	<i>Sterna antillarum athalassos</i>	E
		Lesser Prairie-chicken	<i>Tympanuchus pallidicinctus</i>	C
		Northern Aplomado falcon	<i>Falco femoralis septentrionalis</i>	E
		Whooping Crane	<i>Grus americana</i>	E
	Fish	Arkansas River Shiner	<i>Notropis girardi</i>	T
Plants	Slender rush pea	<i>Hoffmannseggia tenella</i>	E	
Aztec Ruins	Mammals	Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	SOC
	Birds	Yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	C
Big Cypress	Mammals	Florida panther	<i>Puma concolor coryi</i>	E
		West Indian manatee	<i>Trichechus manatus</i>	E
	Birds	Cape Sable seaside sparrow	<i>Ammodramus maritimus mirabilis</i>	E
		Red-cockaded woodpecker	<i>Picoides borealis</i>	E
		Snail kite	<i>Rostrhamus sociabilis plumbeus</i>	E
		Wood stork	<i>Mycteria americana</i>	E
	Reptiles/ Amphibians	American alligator	<i>Alligator mississippiensis</i>	T
		American crocodile	<i>Crocodylus acutus</i>	E
Eastern indigo snake		<i>Drymarchon corais couperi</i>	T	
Big Thicket	Mammals	Louisiana black bear	<i>Ursus americanus luteolus</i>	T
	Birds	Least Tern	<i>Sterna antillarum</i>	E
		Eskimo Curlew	<i>Numenius borealis</i>	E
		Wood stork	<i>Mycteria americana</i>	E
		Red-cockaded Woodpecker	<i>Picoides borealis</i>	E
	Plants	Texan phlox, Texas trailing phlox	<i>Phlox nivalis ssp. Texensis</i>	E
Big South Fork and Obed	Fish	Duskytail darter	<i>Etheostoma percnurum</i>	E
		Blackside dace	<i>Phoxinus cumberlandensis</i>	T
		Palezone shiner	<i>Notropis albizonatus</i>	E

Park Unit	Species Type	Common Name	Scientific Name	Listing Status
Big South Fork and Obed (continued)	Invertebrates	Cumberland elktoe	<i>Alasmidonta atropurpurea</i>	E
		Cumberlandian combshell	<i>Epioblasma brevidens</i>	E
		Cumberland bean	<i>Villosa trabalis</i>	E
		Little-wing pearlymussel	<i>Pegias fabula</i>	E
		Tan riffleshell	<i>Epioblasma florentina walkeri</i>	E
		Dromedary pearlymussel	<i>Dromus dromas</i>	E
		Oyster mussel	<i>Epioblasma capsaeformis</i>	E
		Spectaclecase	<i>Cumberlandia monodonta</i>	C
		Clubshell	<i>Pleurobema clava</i>	E
		Fluted kidneyshell	<i>Ptychobranthus subtentum</i>	C
	Plants	Cumberland sandwort	<i>Minuartia cumberlandensis</i>	E
		Virginia spiraea	<i>Spiraea virginiana</i>	T
		Cumberland rosemary	<i>Conradina verticillata</i>	T
White fringeless orchid		<i>Platanthera integrilabia</i>	C	
Cuyahoga Valley	Mammals	Indiana bat	<i>Myotis sodalis</i>	E
		Northern long-eared bat	<i>Myotis septentrionalis</i>	SOC
	Birds	Bald Eagle	<i>Haliaeetus leucocephalus</i>	SOC
		Henslow's sparrow	<i>Ammodramus henslowii</i>	SOC
		Cerulean warbler	<i>Dendroica cerulea</i>	SOC
	Reptiles/ Amphibians	Blanding's turtle	<i>Emydoidea blandingii</i>	SOC
Cumberland Gap	Mammals	Indiana bat	<i>Myotis sodalis</i>	E
		Gray Bat	<i>Myotis grisescens</i>	E
	Fish	Blackside dace	<i>Phoxinus cumberlandensis</i>	E
Gauley River and New River Gorge	Mammals	Virginia big-eared bat	<i>Corynorhinus townsendii</i>	E
		Indiana bat	<i>Myotis sodalis</i>	E
		Allegheny woodrat	<i>Neotoma magister</i>	SOC
	Invertebrates	Diana fritillary	<i>Speyeria diana</i>	SOC
	Plants	Virginia spiraea	<i>Spiraea virginiana</i>	T
		running buffalo clover	<i>Trifolium stoloniferum</i>	E
Padre Island	Reptiles/ Amphibians	Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	E
		Green Sea Turtle	<i>Chelonia mydas</i>	T
		Atlantic Hawksbill Sea Turtle	<i>Eretmochelys imbricata</i>	E
		Loggerhead Sea Turtle	<i>Caretta caretta</i>	T
		Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	E
		American Alligator	<i>Alligator mississippiensis</i>	T (S/A)
		Texas Horned Lizard	<i>Phrynosoma cornutum</i>	SOC

Appendix E: Federally Listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	Listing Status
Padre Island (continued)	Birds	White-faced Ibis	<i>Plegadis chihi</i>	C
		Piping Plover	<i>Charadrius melodous</i>	T
		Black-capped Vireo	<i>Vireo atricapillus</i>	E
		Cerulean Warbler	<i>Dendroica cerulea</i>	T
		Ferruginous Hawk	<i>Buteo regalis</i>	SOC
		Northern Aplomado Falcon	<i>Falco femoralis</i>	E
		Loggerhead Shrike	<i>Lanius ludovicianus</i>	SOC
		Tropical Parula	<i>Parula pitayumi</i>	C
	Plants	Roughseed Sea Purslane	<i>Sesuvium trianthemoides</i>	C
	Slender Rushpea	<i>Hoffmannseggia tenella</i>	E	
Category 2 Park Units				
Little River Canyon	Mammals	Gray Bat	<i>Myotis grisescens</i>	E
	Fish	blue shiner	<i>Cyprinella caerulea</i>	T
	Plants	Kral's water plantain	<i>Sagittaria secundifolia</i>	T
		harperella	<i>Ptilimnium nodosum</i>	E
		green pitcherplant	<i>Sarracenia oreophila</i>	E
Santa Monica Mountains	Birds	California Condor	<i>Gymnogyps californianus</i>	E
		Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	C
		Light-footed Clapper Rail	<i>Rallus longirostris levipes</i>	E
		California Least Tern	<i>Sterna antillarum browni</i>	E
		Southwestern Willow Flycatcher	<i>Empidonax traillii extrimus</i>	E
		Least's Bell Vireo	<i>Vireo belli pusillus</i>	E
		Western Snowy Plover	<i>Charadrius alexandrius nivosus</i>	T
		California Gnatcatcher	<i>Polioptila Californica</i>	T
	Reptiles/ Amphibians	Arroyo Southwestern Toad	<i>Bufo microscaphus californicus</i>	E
		California Red-legged Frog	<i>Rana draytonii</i>	T
	Fish	Tidewater Goby	<i>Eucyclogobius newberryi</i>	E
		Southern California Steelhead Trout	<i>Oncorhynchus mykiss</i>	E
	Invertebrates	Wright's (Quino) Checkerspot Butterfly	<i>Euphydryas editha quino</i>	E
		Riverside Fairy Shrimp	<i>Steptocephalus wootoni</i>	E

Park Unit	Species Type	Common Name	Scientific Name	Listing Status
Santa Monica Mountains (continued)	Plants	Braunton's milkvetch	<i>Astragalus brauntonii</i>	E
		San Fernando Valley spineflower	<i>Chorizanthe parryi</i> var. <i>fernandina</i>	C
		San Bernardino spineflower	<i>Chorizanthe parryi</i> var. <i>parryi</i>	SOC
		Salt marsh bird's beak	<i>Cordylanthus maritimus</i> ssp. <i>Maritimus</i>	E
		Blochman's larkspur	<i>Delphinium parryi</i> ssp. <i>Blochmaniae</i>	SOC
		Conejo liveforever	<i>Dudleya abramsii</i> ssp. <i>Parva</i>	T
		Blochman's liveforever	<i>Dudleya blochmaniae</i> ssp. <i>Blochmaniae</i>	SOC
		Canyon liveforever	<i>Dudleya cymosa</i> ssp. <i>Agourensis</i>	T
		Marcrescent liveforever	<i>Dudleya cymosa</i> ssp. <i>Marcescens</i>	T
		Santa Monica Mountains liveforever	<i>Dudleya cymosa</i> ssp. <i>Ovatifolia</i>	T
		Many stemmed liveforever	<i>Dudleya multicaulis</i>	SOC
		Verity's liveforever	<i>Dudleya verityi</i>	T
		Conejo Buckwheat	<i>Eriogonum crocatum</i>	SOC
		Santa Susana tarplant	<i>Hemizonia minthornii</i>	SOC
		Coulter goldfields	<i>Lasthenia glabrata</i> var. <i>coulteri</i>	SOC
Lyon's pentachaeta	<i>Pentachaeta lyonii</i>	E		
Dinosaur National Monument	Birds	Spotted Owl	<i>Strix occidentalis lucida</i>	T
	Fish	Razorback Sucker	<i>Xyrauchen texanus</i>	E
		Humpback Chub	<i>Gila cypha</i>	E
		Bonytail Chub	<i>Gila elegans</i>	E
		Roundtail Chub	<i>Gila robusta</i>	E
		Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	E
Great Sand Dunes	Mammals	Canada Lynx	<i>Lynx canadensis</i>	T
		Black-footed ferret	<i>Mustela nigripes</i>	E
	Birds	Gunnison Sage Grouse	<i>Centrocercus minimus</i>	C
		Yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
		Southern willow flycatcher	<i>Empidonax tralill extimus</i>	E
		Bald Eagle	<i>Haliaeetus leucocephalus</i>	T
		Mexican spotted owl	<i>Strix occidentalis lucida</i>	T

Appendix E: Federally Listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	Listing Status
Great Sand Dunes (continued)	Fish	Humpback Chub	<i>Gila cypha</i>	E
		Bonytail Chub	<i>Gila elegans</i>	E
		Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	E
		Razorback Sucker	<i>Xyrauchen texanus</i>	E
	Invertebrates	Uncompahgre fritlary	<i>Solora Improba acrocnerma</i>	E
	Plants	Slender spiderflower	<i>Cieome multicaulis</i>	G
Smith's draba		<i>Draba smithii</i>	G	
Mesa Verde National Park	Birds	Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E
		Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
	Fish	Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	E
		Razorback Sucker	<i>Xyrauchen texanus</i>	E
	Plants	Mancos Milkvetch	<i>Astragalus humillimus</i>	E
		Mesa Verde cactus	<i>Sclerocactus mesae-verde</i>	T
Sand Creek Massacre	No Federally-listed special status species occur within the current park boundary			
Everglades National Park	Mammals	Florida panther	<i>Puma concolor coryi</i>	E
		West Indian Manatee	<i>Trichechus manatus</i>	E
	Birds	Piping Plover	<i>Charadrius melodus</i>	T
		Wood Stork	<i>Mycteria americana</i>	E
		Cape Sable Seaside Sparrow	<i>Ammodramus maritimus mirabilis</i>	E
	Reptiles/ Amphibians	American Alligator	<i>Alligator mississippiensis</i>	T (S/A)
		American Crocodile	<i>Crocodylus acutus</i>	T
		Eastern indigo Snake	<i>Drymarchon corais couperi</i>	T
		Green Sea Turtle	<i>Chelonia mydas</i>	E
		Leatherback sea turtle	<i>Dermochelys coriacea</i>	E
	Fish	Smalltooth Sawfish	<i>Pristis pectinata</i>	E
	Plants	Clusterspike false indigo	<i>Amorpha herbacea var. crenulata</i>	E
		Small's milkpea	<i>Galactia smallii</i>	E
		Garber's sandmat	<i>Chamaesyce garberi</i>	T
Indiana Dunes	Mammals	Indiana bat	<i>Myotis sodalis</i>	E
	Birds	Piping Plover	<i>Charadrius melodous</i>	E
		Kirtland's Warbler	<i>Dendroica kirtlandii</i>	E
	Invertebrates	Karner blue butterfly	<i>Lycaeides melissa samuelis</i>	E
Plants	Pitcher's thistle	<i>Cirsium pitcheri</i>	T	
Nicodemus	No Federally-listed special status species occur within the current park boundary			

Appendices

Park Unit	Species Type	Common Name	Scientific Name	Listing Status
Mammoth Cave	Mammals	gray bat	<i>Myotis grisescens</i>	E
		Indiana bat	<i>Myotis sodalis</i>	E
	Birds	Red-cockaded Woodpecker	<i>Picoides borealis</i>	E
	Invertebrates	Kentucky cave shrimp	<i>Palaemonias ganteri</i>	E
		fanshell	<i>Cyprogenia stegaria</i>	E
		northern riffleshell	<i>Epioblasma torulosa rangiana</i>	E
		pink mucket	<i>Lampsilis abrupta</i>	E
		golf stick pearly mussel, ring pink, ring pink mussel	<i>Obovaria retusa</i>	E
		clubshell	<i>Pleurobema clava</i>	E
		rough pigtoe	<i>Pleurobema plenum</i>	E
Plants	globe bladderpod	<i>Lesquerella globosa</i>	C	
Cane River Creole	No Federally-listed special status species occur within the current park boundary			
Jean Lafitte	No Federally-listed special status species occur within the current park boundary			
Gulf Islands	Mammals	Red Wolf	<i>Canis rufus</i>	E
		Perdido Key Beach Mouse	<i>Peromyscus polionotus trissyllepsis</i>	E
		West Indian Manatee	<i>Trichechus manatus latirostris</i>	E
		Blue whale	<i>Balaenoptera musculus</i>	E
		Finback whale	<i>Balaenoptera physalus</i>	E
		Humpback whale	<i>Megaptera novaeangliae</i>	E
		Sei whale	<i>Balaenoptera borealis</i>	E
		Sperm whale	<i>Physeter macrocephalus</i>	E
	Louisiana black bear	<i>Ursus americanus luteolus</i>	T	
	Birds	Charadrius melodus	<i>Piping Plover</i>	T
		Grus canadensis pulla	<i>Mississippi Sandhill Crane</i>	E
		Mycteria americana	<i>Wood Stork</i>	E
Picoides borealis		<i>Red-Cockaded Woodpecker</i>	E	

Appendix E: Federally Listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	Listing Status
Gulf Islands (continued)	Reptiles/ Amphibians	Gulf Sturgeon	<i>Acipenser oxyrhynchus desotoi</i>	T
		Saltmarsh Topminnow	<i>Fundulus jenkinsi</i>	SOC
		Smalltooth sawfish	<i>Pristis pectinata</i>	E
		Alabama shad	<i>Alosa alabamae</i>	SOC
		Opossum pipefish	<i>Microphis brachyurus lineatus</i>	SOC
		Dusky shark	<i>Carcharhinus obscurus</i>	SOC
		Sand tiger shark	<i>Carcharias taurus</i>	SOC
		Speckled hind	<i>Epinephelus drummondhayi</i>	SOC
		Warsaw grouper	<i>Epinephelus nigritus</i>	SOC
		Scalloped hammerhead shark	<i>Sphyrna lewini</i>	C
		Key silverside	<i>Mendia conchorum</i>	SOC
		Mangrove rivulus	<i>Rivulus marmoratus</i>	SOC
	Fish	Gulf Sturgeon	<i>Acipenser oxyrhynchus desotoi</i>	T
		Saltmarsh Topminnow	<i>Fundulus jenkinsi</i>	SOC
		Smalltooth sawfish	<i>Pristis pectinata</i>	E
		Alabama shad	<i>Alosa alabamae</i>	SOC
		Opossum pipefish	<i>Microphis brachyurus lineatus</i>	SOC
		Dusky shark	<i>Carcharhinus obscurus</i>	SOC
		Sand tiger shark	<i>Carcharias taurus</i>	SOC
		Speckled hind	<i>Epinephelus drummondhayi</i>	SOC
		Warsaw grouper	<i>Epinephelus nigritus</i>	SOC
		Scalloped hammerhead shark	<i>Sphyrna lewini</i>	C
		Key silverside	<i>Mendia conchorum</i>	SOC
		Mangrove rivulus	<i>Rivulus marmoratus</i>	SOC
	Invertebrates	Elkhorn coral	<i>Acropora palmata</i>	T
		Staghorn coral	<i>Acropora cervicornis</i>	T
		Boulder star coral	<i>Montastraea annularis</i>	C
		Boulder star coral	<i>Montastraea franksi</i>	C
		Elliptical star coral	<i>Dichocoenia stokesii</i>	C
		Lamarck's sheet coral	<i>Agaricia lamarcki</i>	C
		Pillar coral	<i>Dendrogyra cylindrus</i>	C
	Plants	Mountainous star coral	<i>Montastraea faveolata</i>	C
		Rough cactus coral	<i>Mycetophyllia ferox</i>	C
Ivory bush coral		<i>Oculina varicosa</i>	SOC	

Appendices

Park Unit	Species Type	Common Name	Scientific Name	Listing Status
Fort Union Trading Post	No Federally-listed special status species occur within the current park boundary			
Theodore Roosevelt	No Federally-listed special status species occur within the current park boundary			
Carlsbad Caverns	Birds	Willow Flycatcher	<i>Empidonax traillii</i>	E
		Black-capped Vireo	<i>Vireo atricapilla</i>	E
	Plants	Lee pincushion	<i>Escobaria sneedii var. leei</i>	T
Hopewell Culture NHP	No Federally-listed special status species occur within the current park boundary			
Washita Battlefield	No Federally-listed special status species occur within the current park boundary			
Flight 93 National Memorial	No Federally-listed special status species occur within the current park boundary			
Fort Necessity National Battlefield	No Federally-listed special status species occur within the current park boundary			
Friendship Hill National Historic Site	No Federally-listed special status species occur within the current park boundary			
Johnstown Flood National Memorial	No Federally-listed special status species occur within the current park boundary			
Steamtown National Historic Site	No Federally-listed special status species occur within the current park boundary			
Upper Delaware Scenic and Recreational River	Invertebrates	Dwarf wedgemussel	<i>Alasmidonta heterodon</i>	E
Guadalupe Mountains	Birds	Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	T
	Plants	Sneed pincushion cactus	<i>Coryphantha sneedii var. sneedii</i>	E
Palo Alto Battlefield	No Federally-listed special status species occur within the current park boundary			
San Antonio Missions	No Federally-listed special status species occur within the current park boundary			
Glen Canyon	Birds	Willow Flycatcher	<i>Empidonax traillii</i>	E
	Fish	razorback sucker	<i>Xyrauchen texanus</i>	E
		humpback chub	<i>Gila cypha</i>	E
		bonytail chub	<i>Gila elegans</i>	E
		roundtail chub	<i>Gila robusta</i>	E
		Colorado pikeminnow	<i>Ptychocheilus lucius</i>	E
		Plants	Brady's hedgehog cactus	<i>Pediocactus bradyi</i>
		Navajo sedge	<i>Carex specuicola</i>	T

Appendix E: Federally Listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	Listing Status
Bluestone National Scenic River	Mammals	Virginia big-eared bat	<i>Corynorhinus townsendii</i>	E
		Indiana bat	<i>Myotis sodalis</i>	E
		Allegheny woodrat	<i>Neotoma magister</i>	SOC
	Invertebrates	Diana fritillary	<i>Speyeria diana</i>	SOC
	Plants	Virginia spiraea	<i>Spiraea virginiana</i>	T
		running buffalo clover	<i>Trifolium stoloniferum</i>	E
Grand Teton	Mammals	Gray wolf	<i>Canis lupus</i>	E
	Birds	Canadian lynx	<i>Lynx canadensis</i>	T
	Plants	sharpleaf buttercup	<i>Ranunculus acriformis</i>	E

E = Endangered; T = Threatened; SOC = Species of Concern; S/A = Similar in Appearance; C = Candidate Species

Source: Species lists by park unit, available through the NPS Integrated Resource Management Applications (IRMA) web portal, available online at <https://irma.nps.gov>. Correspondences are on file with LBG, Inc.

Appendices

APPENDIX F: STATE-LISTED SPECIAL STATUS SPECIES OCCURRING IN CATEGORY 1 AND CATEGORY 2 PARK UNITS

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Category 1 Park Units				
Lake Meredith and Alibates Flint Quarries	Mammals	black-footed ferret	<i>Mustela nigripes</i>	E*
	Birds	interior least tern	<i>Sterna antillarum athalassos</i>	E*
		whooping crane	<i>Grus americana</i>	E*
		Arctic Peregrine falcon	<i>Falco peregrinus tundrius</i>	T
		Peregrine falcon	<i>Falco peregrinus</i>	E
		bald eagle	<i>Haliaeetus leucocephalus</i>	T
	Fish	Arkansas River shiner	<i>Notropis girardi</i>	T*
	Reptiles/Amphibians	Texas horned lizard	<i>Phrynosoma cornutum</i>	T
Aztec Ruins	Mammals	Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	S*
		western small-footed myotis	<i>Myotis ciliolabrum melanorhinus</i>	S
		Yuma myotis	<i>Myotis yumanensis yumanensis</i>	S
		spotted bat	<i>Euderma maculatum</i>	T
		big free-tailed bat	<i>Nyctinomops macrotis</i>	S
		western spotted skunk	<i>Spilogale gracilis</i>	S
		Gunnison's prairie dog	<i>Cynomys gunnisoni</i>	S
		red fox	<i>Vulpes vulpes</i>	S
	Birds	yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	C*
		bald eagle	<i>Haliaeetus leucocephalus</i>	T
		gray vireo	<i>Vireo vicinior</i>	T
		loggerhead shrike	<i>Lanius ludovicianus</i>	S
	Big Cypress	Mammals	Florida panther	<i>Puma concolor coryi</i>
West Indian manatee			<i>Trichechus manatus</i>	E*
mountain lion			<i>Puma concolor</i>	S/A
Big Cypress fox squirrel			<i>Sciurus niger avicennia</i>	T
Everglades mink			<i>Mustela vison evergladensis</i>	T
Florida black bear			<i>Ursus americanus floridanus</i>	T
Birds		American oystercatcher	<i>Haematopus palliatus</i>	SSC
		black skimmer	<i>Rhynchops niger</i>	SSC
		brown pelican	<i>Pelecanus occidentalis</i>	SSC

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Big Cypress (continued)	Birds (continued)	Cape Sable seaside sparrow	<i>Ammodramus maritimus mirabilis</i>	E*
		Florida sandhill crane	<i>Grus canadensis pratensis</i>	T
		least tern	<i>Sterna antillarum</i>	T
		limpkin	<i>Aramus guarauna</i>	SSC
		little blue heron	<i>Egretta caerulea</i>	SSC
		osprey	<i>Pandion haliaetus</i>	SSC
		Peregrine falcon	<i>Falco peregrinus</i>	E
		reddish egret	<i>Egretta rufescens</i>	SSC
		red-cockaded woodpecker	<i>Picooides borealis</i>	SSC*
		Roseate spoonbill	<i>Platalea ajaja</i>	SSC
		snail kite	<i>Rostrhamus sociabilis plumbeus</i>	E*
		snowy egret	<i>Egretta thula</i>	SSC
		tricolored heron	<i>Egretta tricolor</i>	SSC
		white ibis	<i>Eudocimus albus</i>	SSC
		white-crowned pigeon	<i>Columba leucocephala</i>	T
		wood stork	<i>Mycteria americana</i>	E*
	Reptiles/Amphibians	American alligator	<i>Alligator mississippiensis</i>	SSC*
		American crocodile	<i>Crocodylus acutus</i>	E*
		Eastern indigo snake	<i>Drymarchon corais couperi</i>	T*
	Mollusks	Florida tree snail	<i>Liguus fasciatus</i>	SSC
	Plants	airplant	<i>Catopsis berteroniana</i>	E
		auricled spleenwort	<i>Asplenium auritum</i>	E
		Bahama ladder brake fern	<i>Pteris bahamensis</i>	T
		bird's-nest spleenwort	<i>Asplenium serratum</i>	E
		Blodgett's swallowwort	<i>Cynanchum blodgettii</i>	T
		bracted colicroot	<i>Aletris bracteata</i>	E
		catesby lily	<i>Lilium catesbaei</i>	T
		chiggery grapes	<i>Tournefortia hirsutissima</i>	E
		climbing vine fern	<i>Microgramma heterophylla</i>	E
		coastal vervain	<i>Verbena maritima</i>	E
		common wild-pine	<i>Tillandsia fasciculata</i>	E
		coontie	<i>Zamia pumila</i>	CE
		cowhorn	<i>Cyrtopodium punctatum</i>	E
Curacao bush		<i>Cordia globosa</i>	E	
Cypress peperomia	<i>Peperomia glabella</i>	E		

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Big Cypress (continued)	Plants (continued)	delicate ionopsis orchid	<i>Ionopsis utricularioides</i>	E
		dingy-flowered epidendrum	<i>Epidendrum anceps</i>	E
		entire-winged bristle fern	<i>Trichomanes holopterum</i>	E
		Everglades flax	<i>Linum carteri</i>	E
		Everglades palm	<i>Acoelorrhaphe wrightii</i>	T
		Fakahatchee burmannia	<i>Burmannia flava</i>	E
		Florida clamshell orchid	<i>Encyclia cochleata</i>	E
		Florida oncidium	<i>Oncidium floridanum</i>	E
		Florida peperomia	<i>Peperomia obtusifolia</i>	E
		Florida prairie clover	<i>Dalea carthagenensis</i>	E
		Florida royal palm	<i>Roystonea elata</i>	E
		Florida tree fern	<i>Ctenitis sloanei</i>	E
		Florida tripsacum	<i>Tripsacum floridanum</i>	T
		Frosted orchid	<i>Pleurothallis gelida</i>	E
		Fuch's bromeliad	<i>Guzmania monostachya</i>	E
		fuzzy-wuzzy	<i>Tillandsia pruinosa</i>	E
		ghost orchid	<i>Polyrrhiza lindenii</i>	E
		giant sword fern	<i>Nephrolepis biserrata</i>	T
		giant wild-pine	<i>Tillandsia utriculata</i>	E
		greenheart	<i>Colubrina arborescens</i>	E
		guiana plum	<i>Drypetes lateriflora</i>	T
		hand fern	<i>Ophioglossum palmatum</i>	E
		hoary pea	<i>Tephrosia angustissima</i>	E
		hoop vine	<i>Trichostigma octandrum</i>	E
		inflated wild-pine	<i>Tillandsia balbisiana</i>	T
		lace-lip ladies'-tresses	<i>Spiranthes laciniata</i>	T
		lattice-vein fern	<i>Thelypteris reticulata</i>	E
		leafless orchid	<i>Campylocentrum pachyrrhizum</i>	E
		leafy vanilla	<i>Vanilla phaeantha</i>	E
		long-lip ladies'-tresses	<i>Spiranthes longilabris</i>	T
		lowland loosestrife	<i>Lythrum flagellare</i>	E
		mahogany	<i>Swietenia mahogani</i>	T
		many-flowered airplant	<i>Catopsis floribunda</i>	E
		many-flowered grass pink	<i>Calopogon multiflorus</i>	E
meadow joint vetch	<i>Aeschynomene pratensis</i>	E		
night-scented epidendrum	<i>Epidendrum nocturnum</i>	E		
nodding catopsis	<i>Catopsis nutans</i>	E		

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Big Cypress (continued)	Plants (continued)	non-crested eulophia	<i>Eulophia ecristata</i>	T
		ocimum	<i>Ocimum campechianum</i>	E
		pale lidflower	<i>Calyptanthes pallens</i>	T
		pale-flowered polystachya	<i>Polystachya concreta</i>	E
		peperomia	<i>Peperomia humilis</i>	E
		pepperbush	<i>Croton humilis</i>	E
		pineland passionvine	<i>Passiflora pallens</i>	E
		plume polypody	<i>Polypodium plumula</i>	E
		Poeppig's rosemallow	<i>Hibiscus poeppigii</i>	E
		Porter's spurge	<i>Chamaesyce porteriana</i>	E
		rigid epidendrum	<i>Epidendrum rigidum</i>	E
		Rocklands morning-glory	<i>Ipomoea tenuissima</i>	E
		royal fern	<i>Osmunda regalis</i>	CE
		satin leaf	<i>Chrysophyllum oliviforme</i>	T
		Simpson's stopper	<i>Myrcianthes fragrans</i>	T
		Simpson's zephyr-lily	<i>Zephyranthes simpsonii</i>	T
		skyblue clustervine	<i>Jacquemontia pentantha</i>	E
		small ladies'-tresses	<i>Spiranthes brevilabris</i>	E
		snowy orchid	<i>Platanthera nivea</i>	T
		soft-leaved wild-pine	<i>Tillandsia valenzuelana</i>	T
		tall twayblade	<i>Liparis nervosa</i>	E
twisted air plant	<i>Tillandsia flexuosa</i>	T		
umbelled epidendrum	<i>Epidendrum difforme</i>	E		
Big Thicket	Mammals	Louisiana black bear	<i>Ursus americanus luteolus</i>	T*
		American black bear	<i>Ursus americanus</i>	T
	Birds	American swallow-tailed kite	<i>Elanoides forficatus</i>	T
		bald eagle	<i>Haliaeetus leucocephalus</i>	T
		Eskimo curlew	<i>Numenius borealis</i>	E*
		wood stork	<i>Mycteria americana</i>	T*
		Bachman's sparrow	<i>Aimophila aestivalis</i>	T
		reddish egret	<i>Egretta rufescens</i>	T
		white-faced ibis	<i>Plegadis chihi</i>	T
		red-cockaded woodpecker	<i>Picoides borealis</i>	E*
	Fish	blue sucker	<i>Cycleptus elongatus</i>	T
		creek chubsucker	<i>Erimyzon oblongus</i>	T
	Plants	Texan phlox, Texas trailing phlox	<i>Phlox nivalis ssp. Texensis</i>	E*

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Big South Fork and Obed	Mammals	eastern spotted skunk	<i>Spilogale putorius</i>	KY: S
		black bear	<i>Ursus americanus</i>	KY: S
		Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	KY: S;
		gray myotis	<i>Myotis grisescens</i>	KY: T; TN: E*
		eastern small-footed myotis	<i>Myotis leibii</i>	KY: T
		evening bat	<i>Nycticeius humeralis</i>	KY: S
		cotton mouse	<i>Peromyscus gossypinus</i>	KY: T
		masked shrew	<i>Sorex cinereus</i>	KY: S;
	Fish	lake sturgeon	<i>Acipenser fulvescens</i>	KY: E; TN: E
		palezone shiner	<i>Notropis albizonatus</i>	KY: E; TN: E*
		blackside dace	<i>Phoxinus Cumberlandensis</i>	KY: T; TN: T*
		olive darter	<i>Percina squamata</i>	KY: E;
		mountain brook lamprey	<i>Ichthyomyzon greeleyi</i>	KY: T
	Invertebrates	crayfish	<i>Cambarus bouchardi</i>	KY: E; TN: E
		spectaclecase	<i>Cumberlandia monodonta</i>	KY: E*
		Cumberland elktoe	<i>Alasmidonta atropurpurea</i>	KY: E; TN: E*
		elktoe	<i>Alasmidonta marginata</i>	KY: T
		dromedary pearly mussel	<i>Dromus dromas</i>	KY: X; TN: E*
		Cumberlandian combshell	<i>Epioblasma brevidens</i>	KY: E*
		oyster mussel	<i>Epioblasma capsaeformis</i>	KY: E; TN: E*
		tan riffleshell	<i>Epioblasma florentina walkeri</i>	KY: E; TN: E*
		pink mucket	<i>Lampsilis abrupta</i>	KY: E
		little-wing pearly mussel	<i>Pegias fabula</i>	KY: E; TN: E*
		clubshell	<i>Pleurobema clava</i>	KY: E; TN: E*
		Tennessee clubshell	<i>Pleurobema oviforme</i>	KY: E
		fluted kidneyshell	<i>Ptychobranthus subtentum</i>	KY: E
		Cumberland bean	<i>Villosa trabalis</i>	KY: E; TN: E*
	Birds	osprey	<i>Pandion haliaetus</i>	KY: T
		blue-winged teal	<i>Anas discors</i>	KY: T
		hooded merganser	<i>Lophodytes cucullatus</i>	KY: T
		American coot	<i>Fulica americana</i>	KY: E
		rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	KY: S
		brown creeper	<i>Certhia americana</i>	KY: E
		dark-eyed junco	<i>Junco hyemalis</i>	KY: S
		Savannah sparrow	<i>Passerculus sandwichensis</i>	KY: S

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Big South Fork and Obed (continued)	Birds (continued)	Vesper sparrow	<i>Poocetes gramineus</i>	KY: E;
		Blackburnian warbler	<i>Dendroica fusca</i>	KY: T
		golden-winged warbler	<i>Vermivora chrysoptera</i>	KY: T
		Canada warbler	<i>Wilsonia canadensis</i>	KY: S
		red-breasted nuthatch	<i>Sitta canadensis</i>	KY: E
		sedge wren	<i>Cistothorus platensis</i>	KY: S
		least flycatcher	<i>Empidonax minimus</i>	KY: E
		pied-billed grebe	<i>Podilymbus podiceps</i>	KY: E
		northern saw-whet owl	<i>Aegolius acadicus</i>	TN: T
		double-crested cormorant	<i>Phalacrocorax auritus</i>	KY: E
	Reptiles/Amphibians	eastern slender glass lizard	<i>Ophisaurus attenuatus longicaudus</i>	KY: T;
		southeastern five-lined skink	<i>Eumeces inexpectatus</i>	KY: S
	Plants	golden club	<i>Orontium aquaticum</i>	KY: T
		American eelgrass	<i>Vallisneria americana</i>	KY: S
		Tennessee pondweed	<i>Potamogeton tennesseensis</i>	TN: T
		American marshpennywort	<i>Hydrocotyle americana</i>	KY: E; TN: E
		American ginseng	<i>Panax quinquefolius</i>	TN: CE,S
		Canada beadruby	<i>Maianthemum canadense</i>	KY: T
		tuberous grasspink	<i>Calopogon tuberosus</i>	KY: E
		lady's-slipper orchid, moccasin flower, pink ladyslipper, pink lady's-slipper, pink lady's-slipper orchid, pink moccasin flower	<i>Cypripedium acaule</i>	TN: CE,S
		lesser rattlesnake plantain	<i>Goodyera repens</i>	KY: E; TN: S
		crested yellow orchid	<i>Platanthera cristata</i>	KY: T
		palegreen orchid	<i>Platanthera flava var. herbiola</i>	TN: T
		monkeyface, white fringeless orchid	<i>Platanthera integrilabia</i>	KY: E; TN: E
		snakemouth orchid	<i>Pogonia ophioglossoides</i>	KY: E; TN: E
		Lucy Braun's snakeroot	<i>Ageratina luciae-brauniae</i>	KY: S; TN: T
		green and gold	<i>Chrysogonum virginianum</i>	KY: E; TN: T
		hairy coreopsis, star tickseed	<i>Coreopsis pubescens</i>	KY: S
		rockcastle aster	<i>Eurybia saxicastellii</i>	KY: T; TN: E
		rough hawkweed	<i>Hieracium scabrum</i>	TN: T

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Big South Fork and Obed (continued)	Plants (continued)	Monongahela Barbara's buttons	<i>Marshallia grandiflora</i>	KY: E; TN: E
		mountain decumbent goldenrod	<i>Solidago curtisii</i>	KY: T
		Virginia goldenrod	<i>Solidago gracillima</i>	KY: S
		eastern silver aster	<i>Symphotrichum concolor</i>	KY: T
		marsh bellflower	<i>Campanula aparinoides</i>	TN: S
		American bittercress	<i>Cardamine rotundifolia</i>	TN: S
		Cumberland stitchwort	<i>Minuartia cumberlandensis</i>	KY: E; TN: E*
		Appalachian stitchwort	<i>Minuartia glabra</i>	KY: T
		quill fameflower	<i>Talinum teretifolium</i>	KY: E; TN: T
		kidneyleaf grass of Parnassus	<i>Parnassia asarifolia</i>	KY: E
		scentless mock orange	<i>Philadelphus inodorus</i>	KY: T
		arbor vitae, white cedar	<i>Thuja occidentalis</i>	KY: T; TN: S
		American yew, ground hemlock, Canada yew	<i>Taxus canadensis</i>	KY: T; TN: E
		possum haw	<i>Viburnum nudum</i>	KY: E
		sweet pinesap	<i>Monotropsis odorata</i>	KY: T; TN: T
		bearberry, southern mountain cranberry	<i>Vaccinium erythrocarpum</i>	KY: E
		horseflyweed, yellow wild indigo	<i>Baptisia tinctoria</i>	KY: T
		slenderstem peavine	<i>Lathyrus palustris</i>	KY: T; TN: S
		twining snoutbean	<i>Rhynchosia tomentosa</i>	KY: E
		spiked hoarypea	<i>Tephrosia spicata</i>	KY: E
		drumheads	<i>Polygala cruciata</i>	KY: E
		gaywings	<i>Polygala paucifolia</i>	KY: E
		racemed milkwort	<i>Polygala polygama</i>	KY: T
		American chestnut	<i>Castanea dentata</i>	KY: E; TN: S
		Allegheny chinquapin	<i>Castanea pumila</i>	KY: T
		butternut, white walnut	<i>Juglans cinerea</i>	KY: S; TN: T
		sweet fern	<i>Comptonia peregrina</i>	KY: E; TN: E
		maroon Carolina milkvine	<i>Matelea carolinensis</i>	KY: E
		yellow screwstem	<i>Bartonia virginica</i>	KY: T
		Appalachian bristle fern	<i>Trichomanes boschianum</i>	TN: T
		Cumberland rosemary	<i>Conradina verticillata</i>	KY: E; TN: T*
		tenlobe false foxglove	<i>Agalinis obtusifolia</i>	KY: E
spreading yellow false foxglove	<i>Aureolaria patula</i>	KY: S; TN: S		

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Big South Fork and Obed (continued)	Plants (continued)	narrowleaf cowwheat	<i>Melampyrum lineare</i> var. <i>latifolium</i>	KY: T
		eastern sweetshrub	<i>Calycanthus floridus</i> var. <i>glaucus</i>	KY: T
		turk's-cap lily	<i>Lilium superbum</i>	KY: T
		eastern featherbells	<i>Stenanthium gramineum</i>	KY: T
		southern bog clubmoss	<i>Lycopodiella appressa</i>	KY: E
		mercury spurge	<i>Euphorbia mercurialina</i>	KY: T
		St. Peterswort	<i>Hypericum crux-andreae</i>	KY: T
		hornleaf riverweed, threadfoot	<i>Podostemum ceratophyllum</i>	KY: S
		threadleaf evening primrose, threadleaf evening-primrose, threadleaf sundrop	<i>Oenothera linifolia</i>	KY: E
		little evening-primrose	<i>Oenothera perennis</i>	KY: E
		mountain heartleaf	<i>Hexastylis contracta</i>	KY: E
		star sedge, stellate sedge	<i>Carex echinata</i> ssp. <i>echinata</i>	TN: S
		bottlebrush sedge, porcupine sedge	<i>Carex hystericina</i>	KY: H
		nerveless woodland sedge	<i>Carex leptonevia</i>	KY: E
		eastern straw sedge	<i>Carex straminea</i>	KY: T
		Plukenet's flatsedge	<i>Cyperus plukenetii</i>	TN: S
		tawny cottongrass	<i>Eriophorum virginicum</i>	KY: E; TN: E
		loosehead beaksedge	<i>Rhynchospora chalarocephala</i>	TN: T
		Cumberland sandreed	<i>Calamovilfa arcuata</i>	KY: E; TN: E
		wavy hairgrass	<i>Deschampsia flexuosa</i>	KY: T
		needleleaf rosette grass	<i>Dichanthelium aciculare</i>	TN: E
		bearded skeletongrass	<i>Gymnopogon ambiguus</i>	KY: S
		swamp wedgescale	<i>Sphenopholis pensylvanica</i>	KY: S
		spinulose woodfern	<i>Dryopteris carthusiana</i>	KY: S; TN: T
		common maidenhair	<i>Adiantum capillus-veneris</i>	KY: T
		long beech fern, narrow beech fern, northern beech fern	<i>Phegopteris connectilis</i>	TN: S
		American barberry, Canadian or Allegheny barberry	<i>Berberis canadensis</i>	KY: E; TN: S
		southern blue monkshood	<i>Aconitum uncinatum</i>	KY: T
		whiteleaf leather flower	<i>Clematis glaucophylla</i>	TN: E
		goldenseal	<i>Hydrastis canadensis</i>	TN: CE,S

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Big South Fork and Obed (continued)	Plants (continued)	prairie redroot	<i>Ceanothus herbaceus</i>	KY: T
		Appalachian spiraea	<i>Spiraea virginiana</i>	KY: T; TN: E*
		witch alder	<i>Fothergilla major</i>	TN: T
		boykinia	<i>Boykinia aconitifolia</i>	KY: T
		Michaux's saxifrage	<i>Saxifraga michauxii</i>	KY: T
		fox grape, foxgrape	<i>Vitis labrusca</i>	KY: S
		sand grape	<i>Vitis rupestris</i>	KY: T; TN: E
Cuyahoga Valley	Mammals	Indiana bat	<i>Myotis sodalis</i>	E*
		bobcat	<i>Lynx rufus</i>	E
	Birds	American bittern	<i>Botaurus lentiginosus</i>	E
		northern harrier	<i>Circus cyaneus</i>	E
		king rail	<i>Rallus elegans</i>	E
		black tern	<i>Chlidonias niger</i>	E
		yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	E
		golden-winged warbler	<i>Vermivora chrysoptera</i>	E
		Peregrine falcon	<i>Falco peregrinus</i>	T
		osprey	<i>Pandion haliaetus</i>	T
		Upland sandpiper	<i>Bartramia longicauda</i>	T
		black-crowned night heron	<i>Nycticorax nycticorax</i>	T
		dark-eyed junco	<i>Junco hyemalis</i>	T
		hermit thrush	<i>Catharus guttatus</i>	T
		least bittern	<i>Ixobrychus exilis</i>	T
		bald eagle	<i>Haliaeetus leucocephalus</i>	T*
		least flycatcher	<i>Empidonax minimus</i>	T
		sharp-shinned hawk	<i>Accipiter striatus</i>	SOC
		sedge wren	<i>Cistothorus platensis</i>	SOC
		marsh wren	<i>Cistothorus palustris</i>	SOC
		Henslow's sparrow	<i>Ammodramus henslowii</i>	SOC*
		cerulean warbler	<i>Dendroica cerulea</i>	SOC*
		prothonotary warbler	<i>Protonotaria citrea</i>	SOC
		bobolink	<i>Dolichonyx oryzivorus</i>	SOC
		northern bobwhite	<i>Colinus virginianus</i>	SOC
		common moorhen	<i>Gallinula chloropus</i>	SOC
		great egret	<i>Casmerodius albus</i>	SOC
		sora rail	<i>Porzana carolina</i>	SOC
		Virginia rail	<i>Rallus limicola</i>	SOC
		black vulture	<i>Coragyps atratus</i>	SOC
		Canada warbler	<i>Wilsonia canadensis</i>	SI
		magnolia warbler	<i>Dendroica magnolia</i>	SI

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Cuyahoga Valley (continued)	Birds (continued)	northern waterthrush	<i>Seiurus noveboracensis</i>	SI
		winter wren	<i>Troglodytes troglodytes</i>	SI
		black-throated blue warbler	<i>Dendroica caerulescens</i>	SI
		northern saw whet owl	<i>Aegolius acadicus</i>	SI
		pine siskin	<i>Carduelis pinus</i>	SI
		purple finch	<i>Carpodacus purpureus</i>	SI
		red-breasted nuthatch	<i>Sitta canadensis</i>	SI
		Blackburnian warbler	<i>Dendroica fusca</i>	SI
		common snipe	<i>Gallinago gallinago</i>	SI
		northern pintail	<i>Anas acuta</i>	SI
		redhead duck	<i>Aythya americana</i>	SI
		brown creeper	<i>Certhia americana</i>	SI
		long eared owl	<i>Asio otus</i>	SI
		mourning warbler	<i>Oporonis philadelphia</i>	SI
		short eared owl	<i>Asio flammeus</i>	SI
		golden crowned kinglet	<i>Regulus satrapa</i>	SI
		American wigeon	<i>Anas americana</i>	SI
		gadwall	<i>Anas strepera</i>	SI
		green winged teal	<i>Anas crecca</i>	SI
		northern shoveler	<i>Anas clypeata</i>	SI
	ruddy duck	<i>Oxyura jamaicensis</i>	SI	
	yellow headed blackbird	<i>Xanthocephalus xanthocephalus</i>	SI	
	Reptiles/Amphibians	spotted turtle	<i>Clemmys guttata</i>	T
		Blanding's turtle	<i>Emydoidea blandingii</i>	SOC*
	Plants	bristly sarsaparilla	<i>Aralia hispida</i>	E
		drooping wood sedge	<i>Carex arctata</i>	E
		hairy tick-trefoil	<i>Desmodium glabellum</i>	E
		variegated scouring-rush	<i>Equisetum variegatum</i>	E
		ground juniper	<i>Juniperus communis</i>	E
		large-leaved mountain-rice	<i>Oryzopsis asperifolia</i>	E
		Philadelphia panic grass	<i>Panicum philadelphicum</i>	E
		pasture blue grass	<i>Poa saltuensis</i>	E
		compass-plant	<i>Silphium laciniatum</i>	E
spotted coral-root		<i>Corallorhiza maculata</i>	E	
ovate spikerush		<i>Eleocharis ovata</i>	E	
silvery sedge		<i>Carex argyrantha</i>	T	
pipsissewa		<i>Chimaphila umbellata</i>	T	

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Cuyahoga Valley (continued)	Plants (continued)	golden-knees	<i>Chrysogonum virginianum</i>	T
		bearded wheat grass	<i>Elymus trachycaulus</i>	T
		Greene's rush	<i>Juncus greenei</i>	T
		gray beard-tongue	<i>Penstemon canescens</i>	T
		great rhododendron	<i>Rhododendron maximum</i>	T
		leafy goldenrod	<i>Solidago squarrosa</i>	T
		seaside arrow-grass	<i>Triglochin maritimum</i>	T
		bug on a stick (moss)	<i>Buxbaumia aphylla</i>	T
Cumberland Gap	Mammals	Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	KY: S; TN: D, VA: LE, S2
		gray bat	<i>Myotis grisescens</i>	KY: T, S2; TN: E, S2; VA: LE, S1; USFWS: E
		eastern small-footed bat	<i>Myotis leibii</i>	KY: T, S2; TN: D, S2S1
		Indiana bat	<i>Myotis sodalis</i>	KY: E, S1; TN: E, S1; VA: LE, S1; USFWS: E
		woodland jumping mouse	<i>Napaeozapus insignis</i>	TN: D, S4
		Allegheny woodrat	<i>Neotoma magister</i>	TN: D
		hairy-tailed mole	<i>Parascalops breweri</i>	TN: D
		masked shrew	<i>Sorex cinereus</i>	KY: S; TN: D
		long-tailed shrew	<i>Sorex dispar</i>	KY: N (s.d. <i>bitchi</i> : E), S1; TN: D
		smoky shrew	<i>Sorex fumeus</i>	TN: D
		pygmy shrew	<i>Sorex hoyi</i>	TN: S2
		eastern spotted skunk	<i>Spilogale putorius</i>	KY: S, S2
		southern bog lemming	<i>Synaptomys cooperi</i>	TN: D, S4
	black bear	<i>Ursus americanus</i>	KY: S, S2	
	Birds	Swainson's Warbler	<i>Limnothlypis swainsonii</i>	TN: D; VA: SC, S2B
		mourning warbler	<i>Oporornis philadelphia</i>	VA: SC, S1B
		osprey	<i>Pandion haliaetus</i>	KY: T, S2B
		rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	KY: S, S3B
		golden-crowned kinglet	<i>Regulus satrapa</i>	VA: SC, S2B, S5N
		red-brested nuthatch	<i>Sitta canadensis</i>	KY: E, S1B; VA: SC, S2B, S4N
yellow-bellied sapsucker		<i>Sphyrapicus varius</i>	TN: D, S1B, S4N	

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Cumberland Gap (continued)	Birds (continued)	winter wren	<i>Troglodytes troglodytes</i>	VA: SC, S2B, S4N
		golden-winged warbler	<i>Vermivora chrysoptera</i>	KY: T, S2B; TN: D, S3B; VA: SC, S3B
		red-eyed vireo	<i>Vireo olivaceus</i>	VA: SC, S5
		Canada warbler	<i>Wilsonia canadensis</i>	KY: SC, S5
	Fish	western sand darter	<i>Ammocrypta clara</i>	KY: E, S1; TN: T, S1; VA: ST, S1
		rainbow darter	<i>Etheostoma caeruleum</i>	VA: S2
		arrow darter	<i>Etheostoma sagitta</i>	TN: D, S2
		silverjaw minnow	<i>Notropis buccatus</i>	TN: T, S1
		rosyface shiner	<i>Notropis rubellus</i>	TN: D, S2
		tangerine darter	<i>Percina aurantiaca</i>	TN: D; VA: S2
		blackside dace	<i>Phoxinus cumberlandensis</i>	KY: T, S2; TN: T, S2S1; USFWS: T
	Plants	climbing fumitory	<i>Adlumia fungosa</i>	KY: E, S1; TN: T, S2
		tall hairy groovebur	<i>Agrimonia gryposepala</i>	KY: T, S1
		wild leek	<i>Allium tricoccum</i>	TN: S-CE, S1
		fly-poison	<i>Amianthium muscitoxicum</i>	KY: T, S1
		wild sarsaparilla	<i>Aralia nudicaulis</i>	KY: E
		brook saxifrage	<i>Boykinia aconitifolia</i>	KY: T, S2
		Porter's reedgrass	<i>Calamagrostis porteri</i>	KY: N, S2; TN: E, S1
		Porter's reedgrass	<i>Calamagrostis porteri</i> ssp. <i>Porteri</i>	KY: T, S2
		round-leaf water cress	<i>Cardamine rotundifolia</i>	TN: S, S2
		Appalachian sedge	<i>Carex appalachica</i>	KY: T, S2; TN: S1
		tarheel sedge	<i>Carex austrocaroliniana</i>	KY: S; TN: S2
		inland sedge	<i>Carex interior</i>	VA: S1
		purple sedge	<i>Carex purpurifera</i>	VA: S2
		stellate sedge	<i>Carex radiata</i>	KY: N, S2
		American chestnut	<i>Castanea dentata</i>	KY: E, S1; TN: S, S2
		Allegheny chinkapin	<i>Castanea pumila</i>	KY: T, S2
		Allegheny chinkapin	<i>Castanea pumila</i> var. <i>pumila</i>	KY: S1
		Alabama lipfern	<i>Cheilanthes alabamensis</i>	KY: H, SHS1
	satincurls	<i>Clematis catesbyana</i>	KY: H, SHS1	

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Cumberland Gap (continued)	Plants (continued)	Carolina coralbread	<i>Cocculus carolinus</i>	VA: S1
		convallaria	<i>Convallaria majuscula</i>	KY: E, S1
		pale corydalis	<i>Corydalis sempervirens</i>	KY: S; TN: E, S1
		pear hawthorn	<i>Crataegus calpodendron</i>	VA: S1
		pink lady's -slipper	<i>Cypripedium acaule</i>	TN: S-CE, S4
		small yellow lady's slipper	<i>Cypripedium parviflorum</i>	KY: T, S2
		wavy hairgrass	<i>Deschampsia flexuosa</i>	KY: T, S2
		largebract ticktrefoil	<i>Desmodium cuspidatum</i>	VA: S2
		pinebarren ticktrefoil	<i>Desmodium strictum</i>	VA: S2
		nodding wild-rye	<i>Elymus canadensis</i>	VA: S2
		tawny cottongrass	<i>Eriophorum virginicum</i>	KY: E, S1; TN: E, S1
		rattlesnake-master	<i>Eryngium yuccifolium</i>	VA: S2
			<i>Eupatorium incranatum</i>	VA: S2
		Steele's eupatori,	<i>Eupatorium steelei</i>	KY: T, S2
		mercury spurge	<i>Euphorbia mercurialina</i>	KY: T, S1
			<i>Eurybia surculosa</i>	VA: S1
		showy gentian	<i>Gentiana decora</i>	KY: S
		mountain heartleaf	<i>Hexastylis contracta</i>	KY: E, S1
		rough hawkweed	<i>Hieracium scabrum</i>	TN: T, S2
		Canadian summer bluet	<i>Houstonia canadensis</i>	VA: S2
		rock clubmoss	<i>Hyperzia porophila</i>	VA: S1
		golden-seal	<i>Hydrastis canadensis</i>	TN: S-CE
		Shawnee salad	<i>Hydrophyllum virginianum</i>	KY: T, S2; TN: T
		butternut	<i>Juglans cinerea</i>	KY: S, S3; TN: T
		woods-rush	<i>Juncus subcaudatus</i>	KY: N, S1
		smooth veiny peavine	<i>Lathyrus venosus</i>	KY: S, S2
		Canada lily	<i>Lilium canadense</i>	TN: T, S3
		kidkey-leaf twayblade	<i>Listera smallii</i>	KY: T, S2
		limber honeysuckle	<i>Lonicera dioica</i>	TN: S, S2
		runing clubmoss	<i>Lycopodium clavatum</i>	KY: E, S1
		southern loosestrife	<i>Lysimachia tonsa</i>	TN: S2
		bigleaf magnolia	<i>Magnolia macrophylla</i>	VA: S1
		false lily-of-the-valley	<i>Maianthemum canadense</i>	KY: T, S2
		American cow-wheat	<i>Melampyrum lineare</i>	KY: N, S2
American cownwheat	<i>Melampyrum lineare var. latifolium</i>	KY: T, S2		

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Cumberland Gap (continued)	Plants (continued)	small-flowered false helleborne	<i>Melanthium parviflorum</i>	KY: E, S1
		Appalachian sandwort	<i>Minuartia glabra</i>	KY: T, S1
		Appalachian sandwort	<i>Minuartia groenlandica</i>	TN: E, S1S1
		whorled wood aster	<i>Oclemena acuminata</i>	KY: T, S2
			<i>Oligoneuron rigidum</i> var. <i>rigidum</i>	VA: S2
		American ginseng	<i>Panax quinquefolius</i>	TN: S-CE; VA: ST
		silvery nailwort	<i>Paronychia argyrocoma</i>	KY: E< S1; TN: T, S1
		longsepal beardtongue	<i>Penstemon calycosus</i>	VA: S1
		large-leaved phlox	<i>Phlox amplifolia</i>	VA: S2
			<i>Polygonatum biflorum</i> var. <i>commutatum</i>	TN: S2
		halberd-leaf tearthumb	<i>Polygonum arifolium</i>	TN: T, S1
			<i>Prosartes maculata</i>	KY: S
		Allegheny mountain buttercup	<i>Ranunculus allegheniensis</i>	TN: S1
		catawba rhododendron	<i>Rhododendron catawbiense</i>	KY: N, S2
		Carolina rhododendron	<i>Rhododendron minus</i>	TN: S2
		bristly locust	<i>Robinia hispida</i> var. <i>rosea</i>	KY: N, S2
		prairie rose	<i>Rosa setigera</i>	VA: S1
		Virginia rose	<i>Rosa virginiana</i>	TN: S, SH
		smooth blackberry	<i>Rubus canadensis</i>	KY: E, S1
		pursh's wild-petunia	<i>Ruellia purshiana</i>	TN: S, S1
		nettle-leaf sage	<i>Salvia urticifolia</i>	KY: E, S1
		michaux's saxifrage	<i>Saxifraga michauxii</i>	KY: T, S2
		hoary skullcap	<i>Scutellaria incana</i>	VA: S2
		ovate catchfly	<i>Silene ovata</i>	KY: E, S1; TN: E, S2S1
		roundleaf catchfly	<i>Silene rotundifolia</i>	VA: S2
		prairie rosinweed	<i>Silphium terebinthinaceum</i>	TN: S2S1
		white blue-eyed grass	<i>Sisyrinchium albidum</i>	VA: S2
		upright carrionflower	<i>Smilax ecirrata</i>	VA: S1
			<i>Solidago cutrisii</i>	KY: T, S2
		roan mountain goldenrod	<i>Solidago roanensis</i>	KY: T, S1
		twistedstalk	<i>Streptopus lanceolatur</i> var. <i>roseus</i>	TN: S1
		smooth blue aster	<i>Symphotrichum laeve</i>	KY: N, S2

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Cumberland Gap (continued)	Plants (continued)	painted trillium	<i>Trillium undulatum</i>	KY: T, S2
		southern mountain cranberry	<i>Vaccinium erythrocarpum</i>	KY: E, S1
		fox grape	<i>Vitis labrusca</i>	KY: S, S2
		Appalachian cliff fern	<i>Woodsia appalachiana</i>	KY: H, SH; TN: S, S1
	Reptiles/Amphibians	Black Mountain salamander	<i>Desmognathus welteri</i>	TN: D
		Kentucky spring salamander	<i>Gyrinophilus porphyriticus duryi</i>	VA: S2
		four-toed salamander	<i>Hemidactylium scutatum</i>	TN: D
		Cumberland Plateau salamander	<i>Plethodon kentucki</i>	TN: S2
		southern ravine salamander	<i>Plethodon kentucki</i>	TN: S2
	Gauley River and New River Gorge	Mammals	Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>
Virginia big-eared bat			<i>Corynorhinus townsendii</i>	S2*
least shrew			<i>Cryptotis parva</i>	S2
silver-haired bat			<i>Lasiorycteris noctivagans</i>	S2
hoary bat			<i>Lasiurus cinereus</i>	S3
small-footed myotis			<i>Myotis leibii</i>	S1
Indiana bat			<i>Myotis sodalis</i>	S1*
Allegheny woodrat			<i>Neotoma magister</i>	S3*
evening bat			<i>Nycticeius humeralis</i>	SH
golden mouse			<i>Ochrotomys nuttalli</i>	S2
eastern cougar			<i>Puma concolor cougar</i>	SH
eastern mold			<i>Scalopus aquaticus</i>	S3
long-tailed shrew			<i>Sorex dispar</i>	S2, S3
southern pygmy shrew			<i>Sorex hoyi winnerrana</i>	S2, S3
southern bog lemming			<i>Synaptomys cooperi</i>	S2
meadow dumping mouse			<i>Zapus hudsonius</i>	S3
Birds			Cooper's hawk	<i>Accipiter cooperii</i>
		sharp-shinned hawk	<i>Accipiter straitus</i>	S3B, S4N
		spotted sandpiper	<i>Actitis macularia</i>	S3B
		grasshopper sparrow	<i>Ammodramus savannarum</i>	S3B
		green-winged teal	<i>Anas crecca</i>	SHB, S2N
		American Black duck	<i>Anas rubripes</i>	S2B, S4N
		great blue heron	<i>Ardea herodias</i>	S2B, S4N
		American bittern	<i>Botaurus lentiginosus</i>	S1B, S1N
Swainson's thrush	<i>Catharus ustulatus</i>	S1B		

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Gauley River and New River Gorge (continued)	Birds (continued)	brown creeper	<i>Certhis americana</i>	S3B, S4N
		common nighthawk	<i>Chordeiles minor</i>	S3B
		northern harrier	<i>Circus cyaneus</i>	S1B, S3N
		black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	S3B
		northern bobwhite	<i>Colinus virginianus</i>	S3B, S3N
		eastern wood peewee	<i>Contopus virens</i>	SB5
		black vulture	<i>Coragyps atratus</i>	S3
		yellow-rumped warbler	<i>Dendroica coronata</i>	S3B, S3N
		Backburnian warbler	<i>Dendroica fusca</i>	S3B
		bobolink	<i>Dolichonyx oryzivorus</i>	S2B
		horned hawk	<i>Eremophila alpestris</i>	S2B, S3N
		Peregrine falcon	<i>Falco peregrinus</i>	S1B, S2N
		American coot	<i>Fulica americana</i>	S1B, S3N
		bald eagle	<i>Haliaeetus leucocephalus</i>	S2B, S3N
		Swainson's warbler	<i>Limnothlypis swainsonii</i>	S2B
		hooded merganser	<i>Lophodytes cucullatus</i>	S1B, S4N
		red-hooded woodpecker	<i>Melanerpes erythrocephalus</i>	S2B, S3N
		osprey	<i>Pandion haliaetus</i>	S2B, S2N
		cliff swallow	<i>Petrochelidon pyrrhonota</i>	S3B
		pie-billed grebe	<i>Podilymbus podiceps</i>	S2B, S4N
		Vesper sparrow	<i>Pooecetes gramineus</i>	S3B, S3N
		prothonotary warbler	<i>Protonotaria citrea</i>	S2B
		bank swallow	<i>Riparia riparia</i>	S2B
	yellow-billed sapsucker	<i>Sphyrapicus varius</i>	S1B, S3N	
	dickcissel	<i>Spiza americana</i>	S2B	
	golden-winged warbler	<i>Vermivora chrysoptera</i>	S2B	
	Nashville warbler	<i>Vermivora ruficapilla</i>	S1B	
	Fish	candy darter	<i>Etheostoma osburni</i>	S2
		bigmouth chub	<i>Nocomis platyrhynchus</i>	S3, S4
		New River shiner	<i>Notropis scabriceps</i>	S2
		mountain redbelly dace	<i>Phoxinus oreas</i>	S3
		elktoe mussel	<i>Alasmidonta marginata</i>	S2
		purple wartyback	<i>Cyclonaias turberculata</i>	S1
spike mussel		<i>Elliptio dilatata</i>	S2	
wavy-rayed lampmussel		<i>Lampsilis fasciola</i>	S2	
pocketbook mussel		<i>Lampsilis ovata</i>	S1	
green floater		<i>Lasmigona subviridis</i>	S2	

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Gauley River and New River Gorge (continued)	Fish (continued)	maple leaf	<i>Quadrula auqdrula</i>	S2
		lilliput	<i>Toxolasma parvus</i>	S2
	Mussels	pistolgrip	<i>Tritogonia verrucosa</i>	S2
	Invertebrates	swamp metalmark	<i>Calephelis borealis</i>	S2
		tiger beetle	<i>Cicindela ancocisconensis</i>	S3
		Diana fritillary	<i>Speyeria diana</i>	S2
	Plants	dwarf anemone	<i>minima</i>	S1
		purple needlegrass	<i>Aristada purpurascens</i>	S1
		hairy rock-cress	<i>Arabis hirsute var. pycnocarpa</i>	S2
		spreading rock-cress	<i>Arabis patens</i>	S2
		wild false indigo	<i>Baptisia australis</i>	S3
		grass pink	<i>Calopogon tuberosus var. tuberosus</i>	S1
		bitter cress	<i>Cardamine flagelifera</i>	S2
		summer sedge	<i>Carex aestivalis</i>	S2
		Carey's sedge	<i>Carex careyana</i>	S1
		bearded sedge	<i>Carex comosa</i>	S2
		Emory's sedge	<i>Carex emoryi</i>	S1
		inland sedge	<i>Carex interior</i>	S1
		midland sedge	<i>Carex mesochorea</i>	S2
		troublesome sedge	<i>Carex molesta</i>	S3
		black-edge sedge	<i>Carex nigromarginata</i>	S3
		wesk stellate sedge	<i>Carex seorsa</i>	S1
		bent sedge	<i>Carex styloflexa</i>	S1
		prairie straw sedge	<i>Carex suberecta</i>	S1
		cat-tail sedge	<i>Carex typhina</i>	S2
		pretty sedge	<i>Carex woodii</i>	S1, S2
		slender day-flower	<i>Commelina erecta</i>	S2
		spring coralroot	<i>Corallorhiza wisteriana</i>	S2
		star tickweed	<i>Coreopsis pbuescens var. robusta</i>	S2
		northern croton	<i>Croton glandulosus var. septentrionalis</i>	S3
		pretty dodder	<i>Cuscuta indecora</i>	S1
		Fraser's sedge	<i>Cymophyllus fraseriansu</i>	S3
		reflexed flatsedge	<i>Cyperus refractus</i>	S3
awned cyperus	<i>Cyperus squarrosus</i>	S3		
sand tick-trefoil	<i>Desmodium lineatum</i>	S1		

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Gauley River and New River Gorge (continued)	Plants (continued)	flat-stemmed spikerush	<i>Eleocharis compressa</i>	S2
		matted spikerush	<i>Eleocharis intermedia</i>	S1
		creeping spike-rush	<i>Eleocharis palustris</i>	S3
		yellow buckwheat	<i>Erigonum allenii</i>	S2
		vervain thoroughwort	<i>Eupatorium pilosum</i>	S2
		annual fimbry	<i>Fimbristylis annua</i>	S1
		downy milkpea	<i>Galactia volubilis</i>	S2
		Appalachian gentian	<i>Gentiana austromontana</i>	S1
		Canada frostweed	<i>Helianthemum canadense</i>	S2
		smooth sunflower	<i>Helianthus laevigatus</i>	S2
		McDowell sunflower	<i>Helianthus occidentalis</i> <i>spp. Occidentalis</i>	S2
		halberd-leaved mallow	<i>Hibiscus laevis</i>	S2
		coppery St. John's-wort	<i>Hypericum virgatum</i>	S1
		forked rush	<i>Juncus dichotomus</i>	S1
		winged loosestrife	<i>Lythrum alatum</i>	S2
		starflower false Solomon's seal	<i>Maianthemum stellatum</i>	S2
		two-flower melic grass	<i>Melica mutica</i>	S2
		slender water nymph	<i>Najas gracillima</i>	S2
		evening-primrose	<i>Oenothera pilosella</i>	S2
		red pine	<i>Pinus resinosa</i>	S1
		blackseed needlegrass	<i>Piptochaetium avenaceum</i>	S2
		small purple-fringe orchid	<i>Platanthera psycodes</i>	S1
		drooping bluegrass	<i>Poa saltuensis</i>	S1
		rose pogonia	<i>Pogonia ophioglossoides</i>	S2
		Curtis milkwort	<i>Polygala curtissii</i>	S2
		water smartweed	<i>emersum</i>	S2
		hoary mountain-mint	<i>Pycnanthemum incanum</i> <i>var. puberulum</i>	S1
		Loomis' mountain-mint	<i>Pycnanthemum Illmisii</i>	S2
		Torrey's mountain-mint	<i>Pycnanthemum torrei</i>	S1
		low spearwort	<i>Ranunculus pusillus</i>	S1
		globe beaked-rush	<i>Rhynchorpora recognia</i>	S2
		shining willow	<i>Salix lucida</i>	S1
		Carey's saxifrage	<i>Saxifrage careyana</i>	S3
		weakstalk bulrush	<i>Schoenoplectus purchianus</i>	S3
rock skullcap	<i>Scutellaria saxatilis</i>	S2		

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Gauley River and New River Gorge (continued)	Plants (continued)	Virginia cress	<i>Sibaba virginica</i>	S2?
		Virginia mallow	<i>Sida hermaphrodita</i>	S3
		snowy campion	<i>Silene nivea</i>	S1
		Virginia cup-plant	<i>Silphium perfoliatum</i> var. <i>connatum</i>	S1
		Rand's goldenrod	<i>Solidago simpllex</i> ssp <i>randii</i>	S1
		little ladies'-tresses	<i>Spiranthes tuberosa</i>	S3
		Virginia spiraea	<i>Spirea virginiana</i>	G2*
		rough dropseed	<i>Sporobolus clandestinus</i>	S1
		Nuttall's hedge-nettle	<i>Stachys nuttallii</i>	S3
		smooth hedge-nettle	<i>Stachys tenuifolia</i> var. <i>tenuifolia</i>	S3
		mountain meadow-rue	<i>Thalictrum davatum</i>	S1
		Steele's meadow rue	<i>Thalictrum steeleanum</i>	S1
		running buffalo clover	<i>Trifolium stoloniferum</i>	G3*
		nodding pogonia	<i>Triphora trianthophora</i>	S2
		sand grape	<i>Vitis rupestris</i>	S2
		Allegheny cliff fern	<i>Woodsia scopulina</i>	S2
	Reptiles/Amphibians	eastern worm snake	<i>Carphophis amoenus</i>	S3
		timber rattlesnake	<i>Crotalis horridus</i>	S3
		northern coal skink	<i>Eumeces anthracinus anthracinus</i>	S2
		broad-headed skink	<i>Eumeces laticeps</i>	S2
		wood turtle	<i>Glyptemys insculpta</i>	S2
		common map turtle	<i>Graptemys geographica</i>	S2
		rough green snake	<i>Opheodrys aestivus</i>	S3
		river cooter	<i>Pseudemys concinna</i>	S2
		Jefferson salamander	<i>Ambystoma jeffersonianum</i>	S3
		green salamander	<i>Aneides aeneus</i>	S3
		black-bellied salamander	<i>Desmognathus quadramaculatus</i>	S3
		cave salamander	<i>Eurycea lucifuga</i>	S3
		Cumberland Plateau salamander	<i>Plethodon kentucki</i>	S2
		midland mud salamander	<i>Pseudotriton montanus diastictus</i>	S1
northern red salamander	<i>Pseudotriton ruber</i>	S3		

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Padre Island	Reptiles/Amphibians	Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	E*
		green sea turtle	<i>Chelonia mydas</i>	T*
		Atlantic hawksbill sea turtle	<i>Eretmochelys imbricata</i>	E*
		loggerhead sea turtle	<i>Caretta caretta</i>	T*
		leatherback sea turtle	<i>Dermochelys coriacea</i>	E*
		spot-tailed earless lizard	<i>Holbrookia lacerate</i>	SOC
		Texas horned lizard	<i>Phrynosoma cornutum</i>	T*
		Texas indigo snake	<i>Drymarchon corais erebennus</i>	T
		Texas scarlet snake	<i>Cemophora coccinea lineri</i>	T
		Texas tortoise	<i>Gopherus berlandieri</i>	T
	Birds	eastern brown pelican	<i>Pelecanus occidentalis</i>	E
		reddish egret	<i>Egretta rufescens</i>	T
		white-faced ibis	<i>Plegadis chihi</i>	T*
		sooty tern	<i>Sterna fuscata</i>	T
		piping plover	<i>Charadrius melodus</i>	T*
		American Peregrine falcon	<i>Falco Peregrines anatum</i>	T
		bald eagle	<i>Haliaeetus leucocephalus</i>	T
		black-capped vireo	<i>Vireo atricapilla</i>	E*
		northern aplomado falcon	<i>Falco femoralis septentrionalis</i>	E*
		swallow-tailed kite	<i>Elanoides forficatus</i>	T
tropical parula	<i>Parula pitaiyumi</i>	T*		
white-tailed hawk	<i>Buteo albicaudatus</i>	T		
Plants	roughseed sea purslane	<i>Sesuvium trianthemoides</i>	SOC*	
Category 2 Park Units				
Little River Canyon	Mammals	gray bat	<i>Myotis grisescens</i>	AL: SP, E*
		northern bat	<i>Myotis septentrionalis</i>	AL: SP
	Birds	Cooper's hawk	<i>Accipiter cooperii</i>	AL: SP
		golden eagle	<i>Aquila chrysaetos</i>	AL: SP
		bald eagle	<i>Haliaeetus leucocephalus</i>	AL: SP
		osprey	<i>Pandion haliaetus</i>	AL: SP
		merlin	<i>Falco columbarius</i>	AL: SP
	Reptiles/Amphibians	southeastern five-lined skink	<i>Eumeces inexpectatus</i>	AL: SP
		green salamander	<i>Aneides aeneus</i>	AL: SP
		blue shiner	<i>Cyprinella caerulea</i>	AL: SP, T*

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Santa Monica Mountains	Mammals	pallid bat	<i>Antrozous pallidus</i>	SOC
		spotted bat	<i>Euderma maculatum</i>	SOC
		greater western mastiff bat	<i>Eumops perotis californicus</i>	SOC
		California leaf-nosed bat	<i>Macrotus californicus</i>	SOC
		Pacific Western big-eared bat (Townsend's big-eared bat)	<i>Corynorhinus townsendii</i>	SOC
		salt marsh ornate shrew	<i>Sorex ornatus salicornicus</i>	SOC
		American badger	<i>Taxidea taxus</i>	SOC
		coastal desert woodrat	<i>Neotoma lepida intermedia</i>	SOC
		ringtail	<i>Bassariscus astutus</i>	SOC
	Birds	California condor	<i>Gymnogyps californianus</i>	E*
		yellow-billed cuckoo	<i>Coccyzus americanus</i>	T*
		bald eagle	<i>Haliaeetus leucocephalus</i>	E
		light-footed clapper rail	<i>Rallus longirostris levipes</i>	E*
		California least tern	<i>Sterna antillarum browni</i>	E*
		southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	E*
		Least's bell vireo	<i>Vireo belli pusillus</i>	E*
		Belding's Savannah sparrow	<i>Passerculus sandwichensis beldingi</i>	E
		bank swallow	<i>Riparia riparia</i>	T
		western snowy plover	<i>Charadrius alexandrius nivosus</i>	SOC
		California gnatcatcher	<i>Poliopitila Californica</i>	SOC
		western least bittern	<i>Ixobrychus exilis hersperis</i>	SOC
		loggerhead shrike	<i>Lanius ludovicianus</i>	SOC
		tri-colored blackbird	<i>Agelaius tricolor</i>	SOC
		Southern California rufous-crowned sparrow	<i>Aimophial ruficeps canescens</i>	SOC
		northern harrier	<i>Circus cyaneus</i>	SOC
		long-eared owl	<i>Asio otus</i>	SOC
		burrowing owl	<i>Athene cuninularia</i>	SOC
		yellow warbler	<i>Dendrocia petechia</i>	SOC
		grasshopper sparrow	<i>Ammodramus savannarum</i>	SOC
		California horned lark	<i>Eremophila alpestris actia</i>	SOC
		San Diego (Coastal) cactus wren	<i>Campylorhynchus brunneicapillus cousei</i>	SOC

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Santa Monica Mountains (continued)	Birds (continued)	mountain plover	<i>Charadrius montanus</i>	SOC
		golden eagle	<i>Aquila chrysaetos</i>	SOC
		short-eared owl	<i>Asio flammeus</i>	SOC
		white-tailed kite	<i>Elanus Caeruleus</i>	SOC
		yellow-breasted chat	<i>Icteria virens</i>	SOC
		common loon	<i>Gavia immer</i>	SOC
	Reptiles/Amphibians	arroyo southwestern toad	<i>Bufo microscaphus californicus</i>	SOC*
		California red-legged frog	<i>Rana draytonii</i>	SOC*
		coast range newt	<i>Taricha torosa torosa</i>	SOC
		southwestern pond turtle	<i>Emys mamorata pallida</i>	SOC
		Blainville's (Coast) horned lizard	<i>Phrynosoma blainvillii</i>	SOC
		San Diego mountain kingsnake	<i>Lampropeltus zonata pulchra</i>	SOC
		coast patch-nosed snake	<i>Salvadora hexalepis virgultea</i>	SOC
		coastal whiptail	<i>Aspidosceli</i>	SOC
		San Bernardino ringneck snake	<i>Diadophis punctatus modestus</i>	SOC
		two-striped garter snake	<i>Thamnophis hammondi</i>	SOC
		silvery legless lizard	<i>Anniella pulchra pulchra</i>	SOC
	Fish	arroyo chub	<i>Gila orcutti</i>	SOC
		Pacific lamprey	<i>Lampetra tridentata</i>	SOC
	Invertebrates	salt marsh skipper	<i>Panoquina errans</i>	SOC
		Belkins Dune tabanid fly	<i>Brennania belkini</i>	SOC
		Globose dune beetle	<i>Coleus globosus</i>	SOC
Plants	NA	<i>Cordylanthus maritimus ssp. Maritimus</i>	E*	
	NA	<i>Pentachaeta lyonii</i>	E*	
Dinosaur National Monument	Both NPSpecies and park unit staff report no state-listed species.			
Great Sand Dunes	Mammals	Canadian lynx	<i>Lynx canadensis</i>	T
		black-footed ferret	<i>Mustela nigripes</i>	E
		Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	SOC
		northern pocket gopher	<i>Thomomys talpoides agrestis</i>	SOC
	Birds	gunnison sage grouse	<i>Centrocercus minimus</i>	SOC*
		ferruginous hawk	<i>Buteo regalis</i>	SOC
		western snowy plover	<i>Charadrius alexandrinus nivosus</i>	SOC
		mountain plover	<i>Charadrius montanus</i>	SOC

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Great Sand Dunes	Birds (continued)	greater sandhill crane	<i>Grus canadensis tabida</i>	SOC
		yellow-billed cuckoo	<i>Coccyzus americanus</i>	C
		southern willow flycatcher	<i>Empidonax tralill extimus</i>	E*
		bald eagle	<i>Haliaeetus leucocephalus</i>	T*
		Mexican spotted owl	<i>Strix occidentalis lucida</i>	T*
		long-billed curlew	<i>Numenius americanus</i>	SOC
	Fish	humpback chub	<i>Gila cypha</i>	T*
		bonytail chub	<i>Gila elegans</i>	E*
		Rio Grande chub	<i>Gila pandora</i>	SOC
		Rio Grande cutthroat trout	<i>Oncorhynchus clarki virginalis</i>	SOC
		Colorado pikeminnow	<i>Ptychocheilus lucius</i>	T*
		razorback sucker	<i>Xyrauchen texanus</i>	E*
		Rio Grande sucker	<i>Catostomus plebeus</i>	E
	Reptiles/Amphibians	boreal toad	<i>Bufo boreas pop.</i>	E
northern leopard frog		<i>Rana pipiens</i>		
Plants	slender spiderflower	<i>Cleome multicaulis</i>	G*	
	Smith's draba	<i>Draba smithii</i>	G*	
Mesa Verde National Park	Both NPSpecies and park unit staff report no state-listed species.			
Sand Creek Massacre	Both NPSpecies and park unit staff report no state-listed species.			
Everglades National Park	Mammals	Florida panther	<i>Puma concolor coryi</i>	FL: LE, E*
			<i>Ursus americanus floridanus</i>	FL: LT
		Caribbean manatee, manatee, West Indian	<i>Trichechus manatus</i>	FL: LE, E*
	Birds	snail kite	<i>Rostrhamus sociabilis</i>	FL: LE
		snowy plover	<i>Charadrius alexandrinus</i>	FL: LT
		piping plover	<i>Charadrius melodus</i>	FL: LT, T*
		least tern	<i>Sterna antillarum</i>	FL: LT
		roseate tern	<i>Sterna dougallii</i>	FL: LT
		wood stork	<i>Mycteria americana</i>	FL: LE, E*
		white-crowned pigeon	<i>Patagioenas leucocephala</i>	FL: LT
Cape Sable seaside sparrow	<i>Ammodramus maritimus mirabilis</i>	FL: LE, E*		

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Everglades National Park (continued)	Reptiles/Amphibians	American crocodile	<i>Crocodylus acutus</i>	FL: LE, T*
		Loggerhead; cabezon	<i>Caretta caretta</i>	FL: LT
		common green sea turtle, Green Sea Turtle	<i>Chelonia mydas</i>	FL: LE, E*
		Leatherback, leatherback sea turtle, leatherback	<i>Dermochelys coriacea</i>	FL: LE, E*
		gopher tortoise	<i>Gopherus polyphemus</i>	FL: LT
	Plants	tawnyberry, tawnyberry holly	<i>Ilex krugiana</i>	FL: LT
		Florida silver palm	<i>Coccothrinax argentata</i>	FL: LT
		Carter's orchid	<i>Basiphyllaea corallicola</i>	FL: LE
		cowhorn orchid	<i>Cyrtopodium punctatum</i>	FL: LE
		longclaw orchid	<i>Eltroplectris calcarata</i>	FL: LE
		clamshell orchid	<i>Encyclia cochleata var.</i>	FL: LE
		night scented orchid	<i>Epidendrum nocturnum</i>	FL: LE
		Cape Sable orchid	<i>Oncidium undulatum</i>	FL: LE
		Britton's shadow witch	<i>Ponthieva brittoniae</i>	FL: LE
			<i>Sacoila lanceolata var.</i>	FL: LT
		southern ladies'-tresses	<i>Spiranthes torta</i>	FL: LE
		wormvine orchid	<i>Vanilla barbellata</i>	FL: LE
		Bahama sachsia	<i>Sachsia polycephala</i>	FL: LT
		sea rosemary	<i>Argusia gnaphalodes</i>	FL: LE
		smooth strongbark	<i>Bouyeria cassinifolia</i>	FL: LE
		cinnamonbark, wild	<i>Canella winteriana</i>	FL: LE
		Simpson's applecactus	<i>Harrisia simpsonii</i>	FL: LE
		mistletoe cactus	<i>Rhipsalis baccifera</i>	FL: LE
		Christmasberry	<i>Crossopetalum ilicifolium</i>	FL: LT
		Florida crossopetalum	<i>Crossopetalum rhacoma</i>	FL: LT
		Florida boxwood	<i>Schaefferia frutescens</i>	FL: LE
		bracted colicroot	<i>Aletris bracteata</i>	FL: LE
		meadow jointvetch	<i>Aeschynomene</i>	FL: LE
		clusterspike false indigo, crenulate lead-plant	<i>Amorpha herbacea var. crenulata</i>	FL: LE, E*
		Small's milkpea	<i>Galactia smallii</i>	FL: LE, E*
		Everglade Key	<i>Stylosanthes calcicola</i>	FL: LE
		Caribbean princewood	<i>Exostema caribaeum</i>	FL: LE
		Havana skullcap	<i>Scutellaria havanensis</i>	FL: LE
coastal mock vervain	<i>Glandularia maritima</i>	FL: LE		
depressed shrubverbena	<i>Lantana depressa var.</i>	FL: LE		
Sanibel shrubverbena	<i>Lantana depressa var.</i>	FL: LE		

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Everglades National Park (continued)	Plants (continued)	Blodgett's silverbush	<i>Argythamnia blodgettii</i>	FL: LE
		Pineland sandmat, wedge	<i>Chamaesyce deltoidea</i>	FL: LE
		Garber's sandmat	<i>Chamaesyce garberi</i>	FL: LE, E*
		Porter's sandmat	<i>Chamaesyce porteriana</i>	FL: LE
		manchineel	<i>Hippomane mancinella</i>	FL: LE
		Florida Keys noseburn	<i>Tragia saxicola</i>	FL: LT
		Small's flax	<i>Linum carteri</i> var. <i>smallii</i>	FL: LE
		Key byrsonima, Long Key	<i>Byrsonima lucida</i>	FL: LT
		whiteflower passionflower	<i>Passiflora multiflora</i>	FL: LE
		pineland passionflower	<i>Passiflora pallens</i>	FL: LE
		goatsfoot	<i>Passiflora sexflora</i>	FL: LE
		milkbark	<i>Drypetes diversifolia</i>	FL: LE
		upland cotton	<i>Gossypium hirsutum</i>	FL: LE
		white fenrose	<i>Kosteletzkya depressa</i>	FL: LE
		swampbush	<i>Pavonia paludicola</i>	FL: LE
		myrtle of the river, myrtle-	<i>Calyptanthes zuzygium</i>	FL: LE
		redberry stopper	<i>Eugenia confusa</i>	FL: LE
		long-stalk stopper, mangroveberry	<i>Psidium longipes</i>	FL: LT
			<i>Alvaradoa amorphoides</i>	FL: LE
		Polynesian peperomia	<i>Peperomia humilis</i>	FL: LE
		baby rubberplant	<i>Peperomia obtusifolia</i>	FL: LE
		powdery strap airplant	<i>Catopsis berteroniana</i>	FL: LE
		Florida strap airplant	<i>Catopsis floribunda</i>	FL: LE
		West Indian tufted	<i>Guzmania monostachia</i>	FL: LE
		twisted airplant	<i>Tillandsia flexuosa</i>	FL: LT
		Florida flatsedge	<i>Cyperus floridanus</i>	FL: LT
		Florida pineland	<i>Digitaria pauciflora</i>	FL: LT
		Florida gamagrass	<i>Tripsacum floridanum</i>	FL: LT
			<i>Asplenium dentatum</i>	FL: LE
		Florida Tree Fern	<i>Ctenitis sloanei</i>	FL: LE
		clubbed creepingfern	<i>Odontosoria clavata</i>	FL: LE
		hollyleaf fringedfern	<i>Lomariopsis kunzeana</i>	FL: LE
		clinging snakefern	<i>Microgramma</i>	FL: LE
		plumed rockcap fern	<i>Pecluma plumula</i>	FL: LE
		golden leatherfern	<i>Acrostichum aureum</i>	FL: LT
		fragrant maidenhair	<i>Adiantum melanoleucum</i>	FL: LE
fan maidenhair	<i>Adiantum tenerum</i>	FL: LE		
southern lipfern	<i>Cheilanthes microphylla</i>	FL: LE		

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Everglades National Park (continued)	Plants (continued)	Bahama brake	<i>Pteris bahamensis</i>	FL: LT
		least halberd fern	<i>Tectaria fimbriata</i>	FL: LE
		creeping maiden fern	<i>Thelypteris reptans</i>	FL: LE
		toothed latticevein fern	<i>Thelypteris serrata</i>	FL: LE
		Lamarck's trema	<i>Trema lamarckianum</i>	FL: LE
		Cuban nakedwood	<i>Colubrina cubensis var.</i>	FL: LE
		West Indian cherry	<i>Prunus myrtifolia</i>	FL: LT
		West Indian mahogany	<i>Swietenia mahagoni</i>	FL: LT
		white ironwood	<i>Hypelate trifoliata</i>	FL: LE
		Wright's flowering fern	<i>Anemia wrightii</i>	FL: LE
		Eaton's spikemoss	<i>Selaginella eatonii</i>	FL: LE
		bejuco colorado	<i>Ipomoea microdactyla</i>	FL: LE
		rockland morningglory	<i>Ipomoea tenuissima</i>	FL: LE
		pineland clustervine, pineland jacquemontia	<i>Jacquemontia curtissii</i>	FL: LT
	skyblue clustervine	<i>Jacquemontia</i>	FL: LE	
Indiana Dunes	Both NPSpecies and park unit staff report no state-listed species.			
Nicodemus	Both NPSpecies and park unit staff report no state-listed species.			
Mammoth Cave	Mammals	Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	S
		southeastern bat	<i>Myotis austroriparius</i>	E
		gray bat	<i>Myotis grisescens</i>	T*
		eastern small-footed bat	<i>Myotis leibii</i>	T
		Indiana bat	<i>Myotis sodalis</i>	E*
		evening bat	<i>Nycticeius humeralis</i>	S
	Birds	hooded merganser	<i>Lophodytes cucullatus</i>	T
		sharp-shinned hawk	<i>Accipiter striatus</i>	S
		northern harrier	<i>Circus cyaneus</i>	T
		bald eagle	<i>Haliaeetus leucocephalus</i>	T
		osprey	<i>Pandion haliaetus</i>	T
		pie-billed grebe	<i>Podilymbus podiceps</i>	E
		American coot	<i>Fulica americana</i>	E
		rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	S
		brown creeper	<i>Certhia americana</i>	E
		dark-eyed junco	<i>Junco hyemalis</i>	S
		Savannah sparrow	<i>Passerculus sandwichensis</i>	S
		blackburnian warbler	<i>Dendroica fusca</i>	T
		golden-winged warbler	<i>Vermivora chrysoptera</i>	T
Canada warbler	<i>Wilsonia canadensis</i>	S		

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Mammoth Cave (continued)	Birds (continued)	red-breasted nuthatch	<i>Sitta canadensis</i>	E
		sedge wren	<i>Cistothorus platensis</i>	S
		Bewick's wren	<i>Thryomanes bewickii</i>	S
		least flycatcher	<i>Empidonax minimus</i>	E
	Invertebrates	Kentucky cave shrimp, Mammoth cave shrimp	<i>Palaemonias ganteri</i>	E*
		NA	<i>Scoterpes copei</i>	T
		spectacle case, spectaclecase	<i>Cumberlandia monodonta</i>	E
		fanshell	<i>Cyprogenia stegaria</i>	E*
		northern riffleshell	<i>Epioblasma torulosa rangiana</i>	E*
		snuffbox	<i>Epioblasma triquetra</i>	E
		longsolid, long-solid	<i>Fusconaia subrotunda</i>	S
		pink mucket	<i>Lampsilis abrupta</i>	E*
		pocketbook	<i>Lampsilis ovata</i>	E
		golf stick pearly mussel, ring pink, ring pink mussel	<i>Obovaria retusa</i>	E*
		sheepnose	<i>Plethobasus cyphus</i>	E
		clubshell	<i>Pleurobema clava</i>	E*
		rough pigtoe	<i>Pleurobema plenum</i>	E*
		pyramid pigtoe	<i>Pleurobema rubrum</i>	E
		Kentucky creekshell	<i>Villosa ortmanni</i>	T
		clubshell	<i>Pleurobema clava</i>	E
	Fish	spotted darter	<i>Etheostoma maculatum</i>	T
		northern cavefish	<i>Amblyopsis spelaea</i>	S
		southern cavefish	<i>Typhlichthys subterraneus</i>	S
	Reptiles/Amphibians	corn snake	<i>Elaphe guttata</i>	S
		coal skink	<i>Eumeces anthracinus</i>	T
	Plants	delta arrowhead	<i>Sagittaria platyphylla</i>	T
		sessilefruit arrowhead, sessile-fruited arrowhead	<i>Sagittaria rigida</i>	E
		heartleaf pondweed, spotted pondweed	<i>Potamogeton pulcher</i>	T
		cutleaf meadowparsnip	<i>Thaspium pinnatifidum</i>	T
		Eggert's sunflower	<i>Helianthus eggertii</i>	T
		western dwarfdandelion	<i>Krigia occidentalis</i>	E
tansy rosinweed		<i>Silphium pinnatifidum</i>	S	
cypressknee sedge		<i>Carex decomposita</i>	T	
fringed nutrush		<i>Scleria ciliata</i>	E	

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Mammoth Cave (continued)	Plants (continued)	creeping mannagrass	<i>Glyceria acutiflora</i>	E
		bearded skeletongrass	<i>Gymnopogon ambiguus</i>	S
		rough dropseed	<i>Sporobolus clandestinus</i>	T
		redtwig doghobble	<i>Leucothoe recurva</i>	E
		roundhead lespedeza	<i>Lespedeza capitata</i>	S
		stuves lespedeza, tall lespedeza	<i>Lespedeza stuevei</i>	S
		twining snoutbean	<i>Rhynchosia tomentosa</i>	E
		buffalo clover	<i>Trifolium reflexum</i>	E
		American chestnut	<i>Castanea dentata</i>	E
		water oak	<i>Quercus nigra</i>	T
		maroon Carolina milkvine	<i>Matelea carolinensis</i>	E
		yellow screwstem	<i>Bartonia virginica</i>	T
		downy gentian	<i>Gentiana puberulenta</i>	E
		butternut	<i>Juglans cinerea</i>	S
		narrowleaf bluecurls	<i>Trichostema setaceum</i>	E
		eastern sweetshrub	<i>Calycanthus floridus var. glaucus</i>	T
		wood lily	<i>Lilium philadelphicum</i>	T
		false Solomons seal, starry false lily of the vally, starry false Solomon's seal	<i>Maianthemum stellatum</i>	E
		little evening-primrose	<i>Oenothera perennis</i>	E
		spinulose wood fern, spinulose woodfern	<i>Dryopteris carthusiana</i>	S
		French's shootingstar	<i>Dodecatheon frenchii</i>	S
		fox grape	<i>Vitis labrusca</i>	S
		agrimony, tall hairy agrimony, tall hairy grooveburr	<i>Agrimonia gryposepala</i>	T
		Allegheny brookfoam	<i>Boykinia aconitifolia</i>	T
spreading yellow false foxglove	<i>Aureolaria patula</i>	S		
September elm	<i>Ulmus serotina</i>	S		
prostrate blue violet	<i>Viola walteri</i>	T		
Cane River Creole	Both NPSpecies and park unit staff report no state-listed species.			
Jean Lafitte	Both NPSpecies and park unit staff report no state-listed species.			

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Gulf Islands	Mammals	Perdido Key Beach mouse	<i>Peromyscus polionotus trissyllepsis</i>	FL: E*
		West Indian manatee	<i>Trichechus manatus latirostris</i>	FL: E; MS: E*
		blue whale	<i>Balaenoptera musculus</i>	FL: E; MS: E*
		finback whale	<i>Balaenoptera physalus</i>	FL: E; MS: E*
		humpback whale	<i>Megaptera novaeangliae</i>	FL: E; MS: E*
		sei whale	<i>Balaenoptera borealis</i>	FL: E; MS: E*
		sperm whale	<i>Physeter macrocephalus</i>	FL: E; MS: E*
		Louisiana black bear	<i>Ursus americanus luteolus</i>	MS: E*
		Florida black bear	<i>Ursus Aamericanus floridanus</i>	FL: T;
	Birds	burrowing owl	<i>Athene cunicularia</i>	FL: SSC
		southeastern snowy plover	<i>Charadrius alexandrinus tenuirostris</i>	MS: E*
		snowy plover	<i>Charadrius alexandrinus</i>	FL: T; MS: E
		piping plover	<i>Charadrius melodus</i>	FL: T; MS: E*
		Marian's marsh wren	<i>Cistothorus palustris marianae</i>	FL: SSC
		little blue heron	<i>Egretta caerulea</i>	FL: SSC
		reddish egret	<i>Egretta rufescens</i>	FL: SSC
		snowy egret	<i>Egretta thula</i>	FL: SSC
		tricolored heron	<i>Egretta tricolor</i>	FL: SSC
		white ibis	<i>Eudocimus albus</i>	FL: SSC
		Peregrine falcon	<i>Falco peregrinus</i>	MS: E
		Southeastern American kestrel	<i>Falco sparverius paulus</i>	FL: T
		Mississippi sandhill crane	<i>Grus canadensis pulla</i>	MS: E*
		American oystercatcher	<i>Haematopus palliatus</i>	FL: SSC
		bald eagle	<i>Haliaeetus leucocephalus</i>	MS: E
		wood stork	<i>Mycteria americana</i>	FL: E; MS: E*
		osprey	<i>Pandion haliaetus</i>	FL: SSC
		brown pelican	<i>Pelecanus occidentalis</i>	FL: SSC; MS: E
		red-cockaded woodpecker	<i>Picoides borealis</i>	FL: E; MS: E*
		black skimmer	<i>Rynchops niger</i>	FL: SSC
		least tern	<i>Sterna antillarum</i>	FL: T; MS: E
	Reptiles/Amphibians	American alligator	<i>Alligator mississippiensis</i>	FL: SSC
		loggerhead turtle	<i>Caretta caretta</i>	FL: T; MS: E*
		green sea turtle	<i>Chelonia mydas</i>	FL: T; MS: E*
		leatherback turtle	<i>Dermochelys coriacea</i>	FL: E; MS: E*

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Gulf Islands (continued)	Reptiles/Amphibians (continued)	Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	FL: E; MS: E*
		hawksbill sea turtle	<i>Eretmochelys imbricata</i>	FL: E; MS: E*
		eastern indigo snake	<i>Drymarchon corais couperi</i>	FL: T; MS: E*
		gopher tortoise	<i>Gopherus polyphemus</i>	FL: T; MS: E*
		alligator snapping turtle	<i>Macrolemys temminckii</i>	FL: SSC*
		gulf salt marsh snake	<i>Nerodia clarkii clarkii</i>	MS: E*
		Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	FL: SSC*
		black pine snake	<i>Pituophis melanoleucus lodiingi</i>	MS: E*
		dusky gopher frog	<i>Rana capito sevosa</i>	MS: E*
		Alabama redbelly turtle	<i>Pseudemys alabamensis</i>	MS: E*
		Mississippi diamondback terrapin	<i>Malaclemys terrapin pileata</i>	MS: E*
	Fish	gulf sturgeon	<i>Acipenser oxyrhynchus desotoi</i>	FL: SSC; MS: E*
		saltmarsh topminnow	<i>Fundulus jenkinsi</i>	FL: SSC; MS: E*
		smalltooth sawfish	<i>Pristis pectinata</i>	FL: E*
		Alabama shad	<i>Alosa alabamae</i>	FL: SSC; MS: SSC*
		opossum pipefish	<i>Microphis brachyurus lineatus</i>	FL: SSC; MS: SSC*
		dusky shark	<i>Carcharhinus obscurus</i>	FL: SSC; MS: SSC*
		sand tiger shark	<i>Carcharias taurus</i>	FL: SSC; MS: SSC*
		speckled hind	<i>Epinephelus drummondhayi</i>	FL: SSC; MS: SSC*
		Warsaw grouper	<i>Epinephelus nigritus</i>	FL: SSC; MS: SSC*
		scalloped hammerhead shark	<i>Sphyrna lewini</i>	FL: C; MS: C
		key silverside	<i>Mendia conchorum</i>	FL: SSC*
		mangrove rivulus	<i>Rivulus marmoratus</i>	FL: SSC*
		Invertebrates	elkhorn coral	<i>Acropora palmata</i>
	staghorn coral		<i>Acropora cervicornis</i>	FL: T*
	boulder star coral		<i>Montastraea annularis</i>	FL: C*
	boulder star coral		<i>Montastraea franksi</i>	FL: C*
	elliptical star coral		<i>Dichocoenia stokesii</i>	FL: C
	Lamarck's sheet coral		<i>Agaricia lamarcki</i>	FL: C
	pillar coral		<i>Dendrogyra cylindrus</i>	FL: C

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Gulf Islands (continued)	Invertebrates (continued)	mountainous star coral	<i>Montastraea faveolata</i>	FL: C
		rough cactus coral	<i>Mycetophyllia ferox</i>	FL: C
		ivory bush coral	<i>Oculina varicosa</i>	FL: SSC*
	Plants	Cruise's golden aster	<i>Chrysopsis gossypina cruiseana</i>	FL: E
		Florida perforate cladonia	<i>Cladonia perforata</i>	FL: E*
		Gulf Coast lupine	<i>Lupinus westianus</i>	FL: T
		Louisiana quillwort	<i>Isoetes louisianensis</i>	MS: E*
Fort Union Trading Post	Both NPSpecies and park unit staff report no state-listed species.			
Theodore Roosevelt	Both NPSpecies and park unit staff report no state-listed species.			
Carlsbad Caverns	Birds	Lucifer hummingbird	<i>Calothorax lucifer</i>	T
		Costa's hummingbird	<i>Calypte costae</i>	T
		Baird's sparrow	<i>Ammodramus bairdii</i>	T
		thick-billed kingbird	<i>Tyrannus crassirostris</i>	E
		gray vireo	<i>Vireo vicinior</i>	T
		neotropic cormorant	<i>Phalacrocorax brasilianus</i>	T
	Fish	Rio Grande cooter	<i>Pseudemys gorzugi</i>	T
		greenthroat darter	<i>Etheostoma lepidum</i>	T
	Reptiles/Amphibians	gray-banded kingsnake	<i>Lampropeltis alterna</i>	E
		blotched watersnake	<i>Nerodia erythrogaster transversa</i>	E
		mottled rock rattlesnake	<i>Crotalus lepidus lepidus</i>	T
	Plants	shining corralroot	<i>Hexalectris nitida</i>	E
		Guadalupe leastdaisy, Hershey aster	<i>Chaetopappa hersheyi</i>	SOC
		five-flowered rockdaisy	<i>Perityle quinqueflora</i>	SOC
		yellowseed fiddleleaf	<i>Nama xylopodum</i>	SOC
		sparseflower jewelflower	<i>Streptanthus sparsiflorus</i>	SOC
		long-tubercled coryphantha	<i>Coryphantha scheeri var. scheeri</i>	SOC
		Lee pincushion	<i>Escobaria sneedii var. leei</i>	E
		Sneed pincushion	<i>Escobaria sneedii var. sneedii</i>	E
		great sage	<i>Salvia summa</i>	SOC
cardinal beardtongue	<i>Penstemon cardinalis ssp. Regalis</i>	SOC		

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Hopewell Culture NHP	Mammals	big brown bat	<i>Eptesicus fuscus</i>	OH: SC
		little brown bat, little brown myotis	<i>Myotis lucifugus</i>	OH: SC
		northern long-eared bat, northern myotis	<i>Myotis septentrionalis</i>	OH: SC
		Indiana bat	<i>Myotis sodalis</i>	OH: E, E*
	Birds	sharp-shinned hawk	<i>Accipiter striatus</i>	OH: SC
		northern harrier	<i>Circus cyaneus</i>	OH: E
		bald eagle	<i>Haliaeetus leucocephalus</i>	OH: T
		black vulture	<i>Coragyps atratus</i>	OH: SC
		osprey, western osprey	<i>Pandion haliaetus</i>	OH: T
		northern pintail	<i>Anas acuta</i>	OH: SI
		American wigeon	<i>Anas americana</i>	OH: SI
		northern shoveler	<i>Anas clypeata</i>	OH: SI
		eurasian teal, greenwinged teal	<i>Anas crecca</i>	OH: SI
		gadwall	<i>Anas strepera</i>	OH: SI
		redhead	<i>Aythya americana</i>	OH: SI
		ruddy duck	<i>Oxyura jamaicensis</i>	OH: SI
		common tern	<i>Sterna hirundo</i>	OH: E
		upland sandpiper	<i>Bartramia longicauda</i>	OH: T
		Wilson's phalarope	<i>Phalaropus tricolor</i>	OH: SI
		Peregrine falcon	<i>Falco peregrinus</i>	OH: T
		northern bobwhite	<i>Colinus virginianus</i>	OH: SC
		sandhill crane	<i>Grus canadensis</i>	OH: E
		common moorhen	<i>Gallinula chloropus</i>	OH: SC
		sora	<i>Porzana carolina</i>	OH: SC
		king rail	<i>Rallus elegans</i>	OH: E
		Virginia rail	<i>Rallus limicola</i>	OH: SC
		blue grosbeak	<i>Guiraca caerulea</i>	OH: SI
		brown creeper	<i>Certhia americana</i>	OH: SI
		Henslow's sparrow	<i>Ammodramus henslowii</i>	OH: SC
		lark sparrow	<i>Chondestes grammacus</i>	OH: E
		dark-eyed junco	<i>Junco hyemalis</i>	OH: T
		pine siskin	<i>Carduelis pinus</i>	OH: SI
		purple finch	<i>Carpodacus purpureus</i>	OH: SI
bobolink	<i>Dolichonyx oryzivorus</i>	OH: SC		
western meadowlark	<i>Sturnella neglecta</i>	OH: SI		
loggerhead shrike	<i>Lanius ludovicianus</i>	OH: E		

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Hopewell Culture NHP (continued)	Birds (continued)	black-throated blue warbler	<i>Dendroica caerulescens</i>	OH: SI
		cerulean warbler	<i>Dendroica cerulea</i>	OH: SC
		blackburnian warbler	<i>Dendroica fusca</i>	OH: SI
		Kirtland's warbler, Kirtland's wood warbler	<i>Dendroica kirtlandii</i>	OH: E, E*
		magnolia warbler	<i>Dendroica magnolia</i>	OH: SI
		mourning warbler	<i>Oporornis philadelphia</i>	OH: SI
		prothonotary warbler	<i>Protonotaria citrea</i>	OH: SC
		northern waterthrush	<i>Seiurus noveboracensis</i>	OH: SI
		golden-winged warbler	<i>Vermivora chrysoptera</i>	OH: E
		Canada warbler	<i>Wilsonia canadensis</i>	OH: SI
		golden-crowned kinglet	<i>Regulus satrapa</i>	OH: SI
		red-breasted nuthatch	<i>Sitta canadensis</i>	OH: SI
		marsh wren	<i>Cistothorus palustris</i>	OH: SC
		sedge wren	<i>Cistothorus platensis</i>	OH: SC
		Bewick's wren	<i>Thryomanes bewickii</i>	OH: E
		winter wren	<i>Troglodytes troglodytes</i>	OH: SI
		hermit thrush	<i>Catharus guttatus</i>	OH: T
		least flycatcher	<i>Empidonax minimus</i>	OH: T
		Bell's vireo	<i>Vireo bellii</i>	OH: SI
		American bittern	<i>Botaurus lentiginosus</i>	OH: E
		cattle egret, western cattle egret	<i>Bubulcus ibis</i>	OH: E
		little blue heron	<i>Egretta caerulea</i>	OH: SI
		snowy egret	<i>Egretta thula</i>	OH: E
		least bittern	<i>Ixobrychus exilis</i>	OH: T
		black-crowned night heron, black-crowned night-heron	<i>Nycticorax nycticorax</i>	OH: T
		yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	OH: E
		chuck-will's-widow	<i>Caprimulgus carolinensis</i>	OH: SI
		northern saw-whet owl	<i>Aegolius acadicus</i>	OH: SI
		short-eared owl	<i>Asio flammeus</i>	OH: SI
		long-eared owl	<i>Asio otus</i>	OH: SI
		barn owl, common barn-owl	<i>to alba</i>	OH: T
		rough green snake, rough greensnake	<i>Opheodrys aestivus</i>	OH: SC
		queen snake, queensnake	<i>Regina septemvittata</i>	OH: SC
smooth earth snake, smooth earthsnake	<i>Virginia valeriae</i>	OH: SC		

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Hopewell Culture NHP (continued)	Birds (continued)	common box turtle, eastern box turtle	<i>Terrapene carolina</i>	OH: SC
	Plants	arborvitae, eastern white	<i>Thuja occidentalis</i>	OH: P
		spreading sedge	<i>Carex laxiculmis</i>	OH: P
		ovate spikerush, ovoid spikerush, ovoid spikerush	<i>Eleocharis ovata</i>	OH: E
Washita Battlefield	None listed			
Flight 93 National Memorial	Work in progress			
Fort Necessity National Battlefield	Birds	yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	PA: PE
	Plants	American yew	<i>Taxus canadensis</i>	PA: TU
		purple bluets	<i>Houstonia purpurea var. purpurea</i>	PA: TU
		pawpaw	<i>Asimina triloba</i>	PA: N
		bushy St. John's-wort	<i>Hypericum densiflorum</i>	PA: PT
		southern adder's-tongue	<i>Ophioglossum vulgatum</i>	PA: PX
		red pine	<i>Pinus resinosa</i>	PA: N
		slender wheatgrass	<i>Elymus trachycaulus</i>	PA: N
Friendship Hill National Historic Site	Birds	bald eagle	<i>Haliaeetus leucocephalus</i>	PA: PT
		osprey	<i>Pandion haliaetus</i>	PA: PT
		yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	PA: PE
	Plants	harbinger-of-spring	<i>Erigenia bulbosa</i>	PA: PT
		mistflower	<i>Conoclinium coelestinum</i>	PA: N
		sourwood	<i>Oxydendrum arboreum</i>	PA: TU
		pawpaw	<i>Asimina triloba</i>	PA: N
		red pine	<i>Pinus resinosa</i>	PA: N
		wild-oat	<i>Chasmanthium latifolium</i>	PA: TU
		blue monkshood	<i>Aconitum uncinatum</i>	PA: PT
white morning-glory	<i>Ipomoea lacunosa</i>	PA: N		
Johnstown Flood National Memorial	Reptiles/Amphibians	smooth green snake	<i>Liochlorophis vernalis</i>	SOC
Steamtown National Historic Site	Park has not determined whether state-listed special status species occur within the current park boundary			
Upper Delaware Scenic and Recreational River	Birds	bald eagle	<i>Haliaeetus leucocephalus</i>	NY: T
	Invertebrates	dwarf wedgemussel	<i>Alasmidonta heterodon</i>	NY: E; PA: E*
		brook floater mussel	<i>Alasmidonta varicosa</i>	NY: T
	Fish	bridle shiner	<i>Notropis bifrenatus</i>	PA: E*
	Reptiles/Amphibians	timber rattlesnake	<i>Crotalus horridus</i>	NY: T
	Plants	riverweed	<i>Podostemum ceratophyllum</i>	NY: T

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Guadalupe Mountains	Birds	Mexican spotted owl	<i>Strix occidentalis lucida</i>	T
	Plants	sneed pincushion cactus	<i>Coryphantha sneedii</i> var. <i>sneedii</i>	E
Palo Alto Battlefield	Birds	white-tailed hawk	<i>Buteo albicaudatus</i>	T
		wood stork	<i>Mycteria americana</i>	T
		Texas Botteri's sparrow	<i>Aimophila botterii texana</i>	T
		white-faced ibis	<i>Plegadis chihi</i>	T
	Reptiles/Amphibians	regal black-striped snake	<i>Coniophanes imperialis</i>	T
		Texas horned lizard	<i>Phrynosoma cornutum</i>	T
		Berlandier's tortoise, Texas tortoise	<i>Gopherus berlandieri</i>	T
		Mexican smilisca, Mexican treefrog	<i>Smilisca baudinii</i>	T
San Antonio Missions	Birds	Peregrine falcon	<i>Falco peregrinus</i>	T
	Reptiles/Amphibians	Texas tortoise	<i>Gopherus berlandieri</i>	T
Glen Canyon	Mammals	big free-tailed bat	<i>Nyctinomops macrotis</i>	UT: SC
		mule-eared bat, Townsend's big-eared	<i>Corynorhinus townsendii</i>	UT: SC
		spotted bat	<i>Euderma maculatum</i>	AZ: WSC; UT: SC
		Allen's big-eared bat	<i>Idionycteris phyllotis</i>	UT: SC
		fringed myotis	<i>Myotis thysanodes</i>	UT: SC
		silky pocket mouse	<i>Perognathus flavus</i>	UT: SC
	Birds	northern goshawk	<i>Accipiter gentilis</i>	AZ: WSC; UT: CS
		Ferruginous hawk	<i>Buteo regalis</i>	AZ: WSC; UT: SC
		bald eagle	<i>Haliaeetus leucocephalus</i>	AZ: WSC; UT: SC
		California condor	<i>Gymnogyps californianus</i>	AZ: WSC; UT: E
		osprey	<i>Pandion haliaetus</i>	AZ: WSC
		long-billed curlew	<i>Numenius americanus</i>	UT: SC
		yellow-billed cuckoo	<i>Coccyzus americanus</i>	AZ: WSC; UT: C
		Peregrine falcon	<i>Falco peregrinus</i>	AZ: WSC
		sandhill crane	<i>Grus americana</i>	UT: E
		grasshopper sparrow	<i>Ammodramus savannarum</i>	UT: SC
		bobolink	<i>Dolichonyx oryzivorus</i>	AZ: WSC; UT: SC
		gray catbird	<i>Dumetella carolinensis</i>	AZ: WSC
		American redstart	<i>Setophaga ruticilla</i>	AZ: WSC

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Glen Canyon (continued)	Birds (continued)	willow flycatcher	<i>Empidonax traillii</i>	AZ: WSC, *E
		great egret	<i>Ardea alba</i>	AZ: WSC
		snowy egret	<i>Egretta thula</i>	AZ: WSC
		American white pelican	<i>Pelecanus erythrorhynchos</i>	UT: SC
		Lewis's woodpecker	<i>Melanerpes lewis</i>	UT: SC
		Clark's grebe	<i>Aechmophorus clarkii</i>	AZ: WSC
		burrowing owl	<i>Athene cunicularia</i>	UT: SC
		spotted owl	<i>Strix occidentalis</i>	AZ: WSC
	Reptiles/Amphibians	western banded gecko	<i>Coleonyx variegatus</i>	UT: SC
		desert night lizard	<i>Xantusia vigilis</i>	UT: SC
		northern leopard frog	<i>Rana pipiens</i>	AZ: WSC
	Fish	bluehead sucker	<i>Catostomus discobolus</i>	UT: CS
		flannelmouth sucker	<i>Catostomus latipinnis</i>	UT: CS
		razorback sucker	<i>Xyrauchen texanus</i>	AZ: WSC; UT: E, E*
		humpback chub	<i>Gila cypha</i>	AZ: WSC; UT: E, E*
		bonytail, bonytail chub	<i>Gila elegans</i>	AZ: WSC; UT: E
		roundtail chub	<i>Gila robusta</i>	AZ: WSC; UT: CS, E*
		Colorado pikeminnow, Colorado squawfish	<i>Ptychocheilus lucius</i>	AZ: WSC; UT: E, E*
	Plants	Kaibab agave	<i>Agave utahensis</i> var. <i>kaibabensis</i>	AZ: SR
		fineleaf yucca, narrowleaf yucca	<i>Yucca angustissima</i> var. <i>angustissima</i>	AZ: SR
		Kanab yucca	<i>Yucca angustissima</i> var. <i>kanabensis</i>	AZ: SR
		Engelmann's hedgehog cactus, varigated	<i>Echinocereus engelmannii</i> var.	AZ: SR
		Navajo Bridge pricklypear	<i>Opuntia nicholii</i>	AZ: SR
		great pricklypear, Mojave pricklypear	<i>Opuntia phaeacantha</i> var. <i>major</i>	AZ: SR
		Brady's hedgehog cactus, Brady's pediocactus	<i>Pediocactus bradyi</i>	AZ: HS, E*
		cave-dwelling primrose	<i>Primula specuicola</i>	AZ: SR
		Jones' cycladenia, Jones' waxy dogbane, Jones'	<i>Cycladenia humilis</i> var. <i>jonesii</i>	AZ: HS
		lonely lily, lonely-lily	<i>Eremocrinum albomarginatum</i>	AZ: SR
		Navajo sedge	<i>Carex specuicola</i>	AZ: HS, T*

Appendix F: State-listed Special Status Species Occurring in Category 1 and Category 2 Park Units

Park Unit	Species Type	Common Name	Scientific Name	State Listing Status
Bluestone National Scenic River	Both NPSpecies and park unit staff report no state-listed species.			
Grand Teton	Both NPSpecies and park unit staff report no state-listed species.			

Sources: NPS IRMA Species Listings by Park Unit; Personal correspondence with individual park resource specialists conducted between 2010 and 2013. Correspondences are on file with LBG, Inc.

E = Endangered; T = Threatened; FP = Fully Protected; G = Global concern; S = Sensitive; SSC = Special Status Concern; SI = Special Interest; SOC = Species of Concern; S/A = Similar in Appearance; C = Candidate Species; CE = Commercially Exploited

WSC: Wildlife of Special Concern (Animal = Species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines, as described by the Arizona Game and Fish Department's listing of Wildlife of Special Concern in Arizona (WSCA, in prep). Species indicated on printouts as WC are currently the same as those in Threatened Native Wildlife in Arizona (1988).

SP: Species Protected; LE: Listed as Endangered; SC: Wildlife Species of Concern (A wildlife species or subspecies within the state of Utah for which there is credible scientific evidence to substantiate a threat to continued population viability.); LE: Listed as Endangered; LT: Listed as Threatened; PT: Pennsylvania Threatened (Species that may become endangered within the foreseeable future throughout their range in Pennsylvania unless the casual factors affecting the organism are abated)

* Also federally listed

Appendices

**APPENDIX G: FEDERALLY LISTED SPECIES LIKELY TO
OCCUR NEAR WELLS IN CATEGORY 1 PARKS**

Park Unit	Species Type	Common Name	Scientific Name	Listing Status	Likely to Occur Near Wells?	Preferred Habitat	Likely Number of Wells Corresponding to Preferred Habitat
Lake Meredith and Alibates Flint Quarries	Mammals	Black-footed Ferret	<i>Mustela nigripes</i>	E	Yes	Prairie dog towns in grasslands, steppe and shrub steppe	10 (1-Blue Grama, 9-Upland Slopes)
	Birds	Interior Least Tern	<i>Sterna antillarum athalassos</i>	E	Yes	Beaches and sandbars	1 (Drawdown Areas)
		Lesser Prairie-chicken	<i>Tympanuchus pallidicinctus</i>	T	Yes	Mixed grass-dwarf shrub communities that occur on sandy soils	12 (1-Blue Grama, 2-Sand Sagebrush, 9-Upland Slopes)
		Northern Aplomado falcon	<i>Falco femoralis septentrionalis</i>	E	Yes	Open rangeland and savanna, semiarid grasslands with scattered trees and shrubs	17 (1-Blue Grama, 5-Honey Mesquite, 2-Sand Sagebrush, 9-Upland Slopes)
		Whooping Crane	<i>Grus americana</i>	E	No	During migration, prefers marshes, shallow lakes, lagoons, grain and stubble fields, and barrier islands. Nesting occurs in dense emergent vegetation in shallow ponds.	2 (1-Drawdown Areas, 1-Perennial Bottomland)
	Fish	Arkansas River Shiner	<i>Notropis girardi</i>	T	No	Turbid, freshwater, broad, shallow, and unshaded channels of creeks and small to large rivers, over mostly silt and shifting sand bottoms.	None
	Plants	Slender rushpea	<i>Hoffmannseggia tenella</i>	E	No	Sparsely vegetated openings within bluestem-sacahuista grasslands on heavy clay soils of the South Texas Coastal Plain.	None

Appendix G: Federally Listed Species Likely to Occur Near Wells in Category 1 Parks

Park Unit	Species Type	Common Name	Scientific Name	Listing Status	Likely to Occur Near Wells?	Preferred Habitat	Likely Number of Wells Corresponding to Preferred Habitat
Aztec Ruins	Mammals	Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	SOC	No	Mesic habitats characterized by coniferous and deciduous forests, and nearby caves, mine tunnels, and other old buildings.	None
	Birds	Yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	C	No	Deciduous riparian woodland, especially including dense stands of cottonwood and willow.	None
Big Thicket	Mammals	Louisiana black bear	<i>Ursus americanus luteolus</i>	T	No	Diverse, productive bottomland forest with diverse food resources, including a variety of hard-mast-producing species, and little to no human activity.	1 (1-Lower Slope Hardwood Pine)
	Birds	Least Tern	<i>Sterna antillarum</i>	T	No	Beaches and sandbars.	None
		Eskimo Curlew	<i>Numenius borealis</i>	E	No	Nests in open arctic tundra, but inhabits beaches, grasslands, pastures, and plowed fields.	None
		Wood Stork	<i>Mycteria americana</i>	E	No	Mainly freshwater wooded (cypress trees, mangroves, dead hardwoods) lagoons, but also occurs along brackish wetlands and flooded fields, and on islands adjacent to stream or shallow lakes.	None
		Red-cockaded Woodpecker	<i>Picoides borealis</i>	E	Yes	Broad savanna with a scattered overstory of large pines and a dense groundcover containing a diversity of grass, forb, and shrub species.	1 (1-Lower Slope Hardwood Pine)

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Park Unit	Species Type	Common Name	Scientific Name	Listing Status	Likely to Occur Near Wells?	Preferred Habitat	Likely Number of Wells Corresponding to Preferred Habitat
	Plants	Texan phlox, Texas trailing phlox	<i>Phlox nivalis</i> ssp. <i>texensis</i>	E	Yes	Deep, sandy soils in fire-maintained openings in upland longleaf pine savannahs or post oak-bluejack oak woodlands.	1 (1-Lower Slope Hardwood Pine)
Big Southfork and Obed	Fish	Duskytail darter	<i>Etheostoma percnum</i>	E	No	Gravel, rubble, and slabrock pools and runs of small to medium rivers.	None
		Blackside dace	<i>Phoxinus cumberlandensis</i>	T	No	Small upland headwaters and creeks 2-5 meters wide where riffle and pool areas are about equal, and substrates are sand, sandstone, and shale.	None
		Palezone shiner	<i>Notropis albizonatus</i>	E	No	Upland large creeks and small rivers with permanent flow, in runs and flowing upper portions of pools over clean substrates of bedrock, cobble, and gravel mixed with clean sand.	None
	Invertebrates	Cumberland elktoe	<i>Alasmidonta atropurpurea</i>	E	No	Small creeks to medium-sized river with shallow flats or pools with slow current and sand substrate with scattered cobble/boulder material.	None
		Cumberlandian combshell	<i>Epioblasma brevidens</i>	E	No	Typically at depths of less than one meter, in large creeks to large rivers, in substrates ranging from coarse sand to mixtures of gravel, cobble, and boulder-sized particles.	None

Appendix G: Federally Listed Species Likely to Occur Near Wells in Category 1 Parks

Park Unit	Species Type	Common Name	Scientific Name	Listing Status	Likely to Occur Near Wells?	Preferred Habitat	Likely Number of Wells Corresponding to Preferred Habitat
		Cumberland bean	<i>Villosa trabalis</i>	E	No	Buried in shallow riffle and shoal areas, often located under large rocks, at depths less than 1 meter.	None
		Little-wing pearl mussel	<i>Pegias fabula</i>	E	No	At the head of riffles of small, cool streams with sand and fine gravel between cobble in 6-10 inches of water.	None
		Tan riffleshell	<i>Epioblasma florentina walkeri</i>	E	No	Freshwater headwaters, riffles, and shoals in sand and gravel substrates.	None
		Dromedary pearl mussel	<i>Dromus dromas</i>	E	No	Clean, fast-flowing water in substrates that contain relatively firm rubble, gravel, and stable, clean substrates.	None
		Oyster mussel	<i>Epioblasma capsaeformis</i>	E	No	Moderate to swift currents in large creeks and rivers in substrates composed of coarse sand and gravel to boulder-sized particles.	None
		Spectaclecase	<i>Cumberlandia monodonta</i>	C	No	In firm mud between large rocks in quiet water very near the interface with swift currents of large rivers.	None
		Clubshell	<i>Pleurobema clava</i>	E	No	Sand/gravel substrate in riffle/run situations in less than 1.5 feet of water, in small to medium-sized rivers.	None

Appendices

Park Unit	Species Type	Common Name	Scientific Name	Listing Status	Likely to Occur Near Wells?	Preferred Habitat	Likely Number of Wells Corresponding to Preferred Habitat
		Fluted kidneyshell	<i>Ptychobranchnus subtentum</i>	C	No	Sand, gravel, and cobble substrates in small to medium rivers, in areas with swift currents or riffles with flowing, well-oxygenated waters.	None
	Plants	Cumberland sandwort	<i>Minuartia cumberlandensis</i>	E	No	Found on the sandy floors of cool, humid, cave-like overhangs called rock houses, which are formed through the differential weathering of sandstone strata ledges.	None
		Virginia spiraea	<i>Spiraea virginiana</i>	T	Yes	Periodically flood-scoured banks of high-gradient mountain streams in areas with deciduous trees and shrubs, and sometimes associated with an herbaceous wetland.	50 (24-Lowland or Submontane Cold Deciduous Forests, 23-Successional Forests, 3-Upland Deciduous Forests)
		Cumberland rosemary	<i>Conradina verticillata</i>	T	No	Boulder/cobble/gravel-bars, sand bars and islands, sandy river banks, floodplains in river gorges, and similar sunny riparian areas where seasonal flooding minimizes competition and creates new gravel-bar habitats.	None
		White fringeless orchid	<i>Platanthera integrilabia</i>	C	No	Wet, flat, boggy areas at the head of streams or seepage slopes.	None

Appendix G: Federally Listed Species Likely to Occur Near Wells in Category 1 Parks

Park Unit	Species Type	Common Name	Scientific Name	Listing Status	Likely to Occur Near Wells?	Preferred Habitat	Likely Number of Wells Corresponding to Preferred Habitat
Cuyahoga Valley	Mammals	Indiana bat	<i>Myotis sodalis</i>	E	Yes	Hibernates in caves; maternity sites generally are behind loose bark of dead or dying trees or in tree cavities; foraging habitats include riparian areas, upland forests, ponds, and fields.	50 (5-Cultivated Crops, 19-Deciduous Forest, 8-Open Space Developed, 8-Grassland, 10-Pasture)
		Northern long-eared bat	<i>Myotis septentrionalis</i>	SOC	Yes	Old-growth forests composed of trees 100 years old or older, with intact interior forest habitat, uneven forest structure (resulting in multilayered vertical structure), single and multiple tree-fall gaps, standing snags, and woody debris.	4-Evergreen Forests
	Birds	Bald Eagle	<i>Haliaeetus leucocephalus</i>	SOC	Yes	Breeding habitat most commonly includes areas close to (within 4 km) coastal areas, bays, rivers, lakes, reservoirs, or other bodies of water that reflect the general availability of primary food sources including fish, waterfowl, or seabirds.	23 (19-Deciduous Forest, 4-Evergreen Forests)
		Henslow's sparrow	<i>Ammodramus henslowii</i>	SOC	Yes	Open fields and meadows with grass interspersed with weeds or shrubby vegetation, especially in damp or low-lying areas.	32 (5-Cultivated Crops, 8-Open Space Developed, 8-Grassland, 10-Pasture, 1-Shrub)
		Cerulean warbler	<i>Dendroica cerulea</i>	SOC	Yes	A structurally mature hardwood forest in a mesic or wetter situation, with a closed canopy.	23 (19-Deciduous Forest, 4-Evergreen Forest)

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Park Unit	Species Type	Common Name	Scientific Name	Listing Status	Likely to Occur Near Wells?	Preferred Habitat	Likely Number of Wells Corresponding to Preferred Habitat
	Reptiles/ Amphibians	Blanding's turtle	<i>Emydoidea blandingii</i>	SOC	No	Waters with soft bottom and aquatic vegetation, such as marshes, ponds, swamps, lake shallows, backwater sloughs, shallow slow-moving rivers, protected coves and inlets of large lakes, oxbows, and pools adjacent to rivers.	None
Cumberland Gap	Mammals	Indiana bat	<i>Myotis sodalis</i>	E	Unknown	Hibernates in caves; maternity sites generally are behind loose bark of dead or dying trees or in tree cavities; foraging habitats include riparian areas, upland forests, ponds, and fields.	Unknown Vegetation Types
		Gray Bat	<i>Myotis grisescens</i>	E	Unknown	In caves with adjacent forested areas along the banks of streams and lakes.	Unknown Vegetation Types
	Fish	Blackside dace	<i>Phoxinus cumberlandensis</i>	E	No	Small upland headwaters and creeks 2-5 meters wide where riffle and pool areas are about equal, and substrates are sand, sandstone, and shale.	None
Gauley River	Mammals	Virginia big-eared bat	<i>Corynorhinus townsendii</i>	E	Yes	Limestone karst regions dominated by mature hardwood forests of hickory, beech, maple, and hemlock.	7 (1-Hemlock, 5-Oak Forests, 1-Oak-Ericad Forest)
		Indiana bat	<i>Myotis sodalis</i>	E	Yes	Hibernates in caves; maternity sites generally are behind loose bark of dead or dying trees or in tree cavities; foraging habitats include riparian areas, upland forests, ponds, and fields.	7 (1-Hemlock, 5-Oak Forests, 1-Oak-Ericad Forest)

Appendix G: Federally Listed Species Likely to Occur Near Wells in Category 1 Parks

Park Unit	Species Type	Common Name	Scientific Name	Listing Status	Likely to Occur Near Wells?	Preferred Habitat	Likely Number of Wells Corresponding to Preferred Habitat
		Allegheny woodrat	<i>Neotoma magister</i>	SOC	No	Extensive rocky areas such as outcrops, cliffs, talus slopes with boulders and crevices, and caves.	None
	Invertebrates	Diana fritillary	<i>Speyeria diana</i>	SOC	Yes	Deciduous or mixed forest with a lot of violets in the understory.	7 (1-Hemlock, 5-Oak Forests, 1-Oak-Ericad Forest)
	Plants	Virginia spiraea	<i>Spiraea virginiana</i>	T	Yes	Periodically flood-scoured banks of high-gradient mountain streams in areas with deciduous trees and shrubs, and sometimes associated with a herbaceous wetland.	7 (1-Hemlock, 5-Oak Forests, 1-Oak-Ericad Forest)
		Running buffalo clover	<i>Trifolium stoloniferum</i>	E	Yes	Mesic woodlands in partial to filtered sunlight, where there is periodic disturbance for a prolonged period (e.g., mowing, trampling, or grazing).	7 (1-Hemlock, 5-Oak Forests, 1-Oak-Ericad Forest)

Source: NPS IRMA Species Listings by Park Unit; Personal correspondence with individual park resource specialists conducted between 2010 and 2013. Correspondences are on file with LBG, Inc.

E = Endangered; T = Threatened; SOC = Species of Concern; C = Candidate Species

Appendices

APPENDIX H: CONSULTATION LETTERS AND RESPONSES

TRIBAL CONSULTATION



United States Department of the Interior

NATIONAL PARK SERVICE
Geologic Resources Division
P.O. Box 25287
Denver, Colorado 80225

IN REPLY REFER TO:

November 14, 2013



Dear :

The National Park Service (NPS) is preparing a Draft Programmatic Environmental Impact Statement (DEIS) on revisions to nonfederal oil and gas rights regulations Title 36, Code of Federal Regulations, Part 9, Subpart B (“9B regulations”). In our effort to involve you in this planning effort, I am writing to update you about this project and to inquire if you desire to consult with the NPS regarding the proposed project. The DEIS and Proposed Rule will be released for public comment in 2014. We will consult again with you when the DEIS and Proposed Rule is released. The NPS is available to discuss the project with you in more detail if necessary.

The existing 9B regulations govern the exercise of nonfederal (state and privately owned) oil and gas rights within the boundaries of units of the National Park System. These regulations have been in effect for over thirty years and have not been substantively updated during that period. The EIS will analyze a range of reasonable alternatives for revising the existing 9B regulations and the potential environmental impacts on park resources including: threatened and endangered species, water resources, soils, vegetation, wetlands, air resources, wildlife, cultural resources, and soundscapes. Effects on oil and gas operators, visitor experience and public safety, adjacent lands, and park operations will also be analyzed.

Executive Order 13175, Federal regulations (36 CFR 800.2) implementing Section 106 of the National Historic Preservation Act of 1966, as amended, and NPS Management Policies all require consultation with federally recognized American Indian tribes on a government-to-government basis. The NPS has identified your tribe as one affiliated with one or more of the following park units listed in Attachment 1 (Category 1 parks have current oil and gas operations, Category 2 parks do not have active operations, but have potential for future operations).

The 9B regulations control all activities associated with nonfederal oil and gas development inside park boundaries where access is on, across, or through federally owned or controlled lands or waters. At this time 534 nonfederal oil and gas operations exist in a total of 12 units of the National Park System.

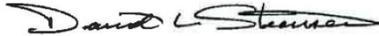
The purpose of the 9B regulations is to avoid or minimize the adverse effects of nonfederal oil and gas operations on natural and cultural resources, visitor uses and experiences, provide for public safety, and minimize adverse effects on park infrastructure and management.

Revisions to the 9B regulations are proposed as follows:

- Remove exemptions from 9B regulations for currently exempt operators,
- Ensure funding for reclamation by removing an insufficient regulatory bonding cap and making bond amounts equal to the cost of reclamation,
- Add authority to cite operators for minor acts of noncompliance,
- Require compensation for operator's privileged use of federal lands,
- Improve the workability of the permitting procedures, and
- Account for improvements in oil and gas technology and industry practices.

For more information on the rulemaking effort, please see http://www.nature.nps.gov/geology/oil_and_gas/9b_index.cfm. If you wish to consult with the NPS regarding this project, please write to the address above or contact Michael B. Edwards of the NPS's Environmental Quality Division at (303) 969-2694, michael_b_edwards@nps.gov, or Edward O. Kassman, Jr., of the NPS's Geologic Resources Division at (303) 969-2146, edward_kassman@nps.gov. Thank you for your consideration.

Sincerely,



David L. Steensen, Chief
Geologic Resources Division

1/2/14

DEPARTMENT OF THE INTERIOR Mail - 9B regulations



9B regulations

Ron P. Maldonado <ronpmaldonado@navajo-nsn.gov>
To: "michael_b_edwards@nps.gov" <michael_b_edwards@nps.gov>
Cc: "edward_kassman@nps.gov" <edward_kassman@nps.gov>

Fri, Dec 27, 2013 at 11:32 AM

Gentlemen, the Navajo Nation request a formal face to face meeting with the NPS to discuss the DEIS.

Ronald P. Maldonado, acting Tribal Historic Preservation Officer
Programs Manager
Cultural Resource Compliance Section
Facility Management Program
Navajo Nation Historic Preservation Department
Ph (928) 871-7132/7145
Cell 505-870-2830
Fax (928)871-7886

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United States Department of the Interior

NATIONAL PARK SERVICE
Geologic Resources Division
P.O. Box 25287
Denver, Colorado 80225

April 29, 2014

Navajo Nation
Ronald P. Maldonado
Acting Tribal Historic Preservation Officer
Navajo Nation Historic Preservation Department
P.O. Box 9000
Window Rock, AZ 86515

Dear Mr. Maldonado:

Thank you for your response to the National Park Service's (NPS) initial tribal consultation letter regarding the Draft Programmatic Environmental Impact Statement (DEIS) on revisions to nonfederal oil and gas rights regulations Title 36, Code of Federal Regulations, Part 9, Subpart B ("9B regulations") and Proposed Rule.

Your response requested a formal face to face meeting to discuss the DEIS. We would welcome such a meeting and will follow up with you shortly regarding those details.

Please note that of the 39 NPS park units with which you are traditionally associated, this DEIS only addresses 5 units: Aztec Ruins National Monument, Dinosaur National Monument, Glen Canyon National Recreation Area, Great Sand Dunes National Park, and Mesa Verde National Park. Of these 5 units, only Aztec Ruins National Monument contains active oil and gas operations. The remaining 4 units are denoted as category 2 units for purposes of the DEIS, which means that there is the possibility that non-federal oil and gas development could occur in the future, but is not currently occurring.

Aztec Ruins National Monument contains four active oil and gas operations. Two existing operations are currently regulated by NPS, one was directionally drilled from outside park boundaries and issued a 9.32(e) exemption, and one well is grandfathered and currently exempt from the NPS 9B Oil and Regulations. The exemption relating to this grandfathered well would be eliminated under the NPS's proposed regulatory revisions. Application of the 9B regulations to the operation of this well would then provide additional resource protection, primarily by requiring that the operator meet NPS operating standards and maintain financial assurance to ensure compliance with the regulations, including proper reclamation of the area of operation. Specific operational mitigation measures would include improved road and pad maintenance to reduce erosion and sedimentation and control vegetation. Road upgrades necessary to prevent

impacts to cultural resources would also be identified during the permit process (which would occur if the NPS proposed regulatory revision is adopted).

The proposed rule would also cover any future oil and gas operations occurring inside National Park units, including any future operations at the park units listed above. Any future operations would undergo site specific environmental compliance, as well as tribal consultation, prior to any permit being issued.

We will be in touch with you shortly regarding formal face to face consultation, and will also consult with you again when the DEIS and Proposed Rule are released. For more information on the rulemaking effort, please see http://www.nature.nps.gov/geology/oil_and_gas/9b_index.cfm. You may also contact Michael B. Edwards of the NPS's Environmental Quality Division at (303) 969-2694, michael_b_edwards@nps.gov, or Edward O. Kassman, Jr., of the NPS's Geologic Resources Division at (303) 969-2146, edward_kassman@nps.gov. Thank you for your consideration.

Sincerely,

A handwritten signature in black ink that reads "David L. Steensen". The signature is written in a cursive style with a large initial "D".

David L. Steensen, Chief
Geologic Resources Division

12/20/13



SAN CARLOS APACHE TRIBE
Historic Preservation & Archaeology Department
P.O. Box 0
San Carlos Arizona 85550
Tel. (928) 475-5797. Fax (928) 475-2423

Tribal Consultation Response Letter

Date: 12/12/13
Contact Name: Ronald L. Steenson, Chief Attachments: michael_h-edwards@nps.gov
Company: NPS - Historic Resources Division
Address: PO Box 257 Denver, CO 80226
Project Name/ #: _____

Dear Sir or Madam: DLIS 16 CFR, Part 12 Subject B ('93 regulations')
Under Section 106 and 110 of the National Historic Preservation Act, we are replying to the above referenced project. Please see the appropriate marked circle, including the signatures of Vernelda Grant, Tribal Historic Preservation Officer (THPO), and the concurrence of the Chairman of the San Carlos Apache Tribe:

- NO INTEREST/NO FURTHER CONSULTATION _____ (sign & date)
I have determined that there is not a likelihood of eligible properties of religious and cultural significance to the San Carlos Apache Tribe in the proposed project area.
- CONCURRENCE WITH REPORT FINDINGS & THANK YOU Vernelda Grant 12/12/13 (sign & date)
- REQUEST ADDITIONAL INFORMATION _____ (sign & date)
I require additional information in order to provide a finding of effect for this proposed undertaking, i.e. Project description ___ Map ___ Photos Other we would like to connect with the
- NO EFFECT _____ (sign & date) All resources on Navajo de Pledge
I have determined that there are no properties of religious and cultural significance to the San Carlos Apache Tribe that are listed on the National Register within the area of potential effect or that the proposed project will have no effect on any such properties that may be present.
- NO ADVERSE EFFECT _____ (sign & date)
Properties of cultural and religious significance within the area of effect have been identified that are eligible for listing in the National Register for which there would be no adverse effect as a result of the proposed project.
- ADVERSE EFFECT _____ (sign & date)
I have identified properties of cultural and religious significance within the area of potential effect that are eligible for listing in the National Register. I believe the proposed project would cause an adverse effect on these properties. Please contact the THPO for further discussion.

STIPULATION: We were taught traditionally not to disturb the natural world in a significant way, and that to do so may cause harm to oneself or one's family. Apache resources can be best protected by managing the land to be as natural as it was in pre-1870s settlement times. Please contact the THPO, if there is a change in any portion of all previously discussed projects. Thank you for contacting the San Carlos Apache Tribe, your effort is greatly appreciated.

CONCURRENCE: Terry Rambler 12/16/13
Terry Rambler, Tribal Chairman Date



IN REPLY REFER TO:

United States Department of the Interior

NATIONAL PARK SERVICE
Geologic Resources Division
P.O. Box 25287
Denver, Colorado 80225

April 29, 2014

San Carlos Apache Tribe
Historic Preservation and Archaeology Department
ATTN: Vernelda Grant
PO Box 0
San Carlos, AZ 85550

Dear Chairman Rambler:

Thank you for your response to the National Park Service's (NPS) initial tribal consultation letter regarding the Draft Programmatic Environmental Impact Statement (DEIS) on revisions to nonfederal oil and gas rights regulations Title 36, Code of Federal Regulations, Part 9, Subpart B ("9B regulations") and Proposed Rule.

Your response requested concurrence with our report findings, and requested additional information on any occurrences within New Mexico parks. Currently, there is only one park within New Mexico, Aztec Ruins National Monument, which has active oil and gas operations (four total). Two existing operations are currently regulated by NPS, one was directionally drilled from outside park boundaries and issued a 9.32(e) exemption, and one well is grandfathered and currently exempt from the NPS 9B Oil and Regulations. Note that the exemption relating to this grandfathered well would be eliminated under the NPS's proposed regulatory revisions. Application of the 9B regulations to the operation of this well would then provide additional resource protection, primarily by requiring that the operator meet NPS operating standards and maintain financial assurance to ensure compliance with the regulations, including proper reclamation of the area of operation. Specific operational mitigation measures would include improved road and pad maintenance to reduce erosion and sedimentation and control vegetation. Road upgrades necessary to prevent impacts to cultural resources would also be identified during the permit process (which would occur if the NPS proposed regulatory revision is adopted).

The proposed rule would also cover any future oil and gas operations occurring inside National Park units, including any future operations at Aztec Ruins National Monument, Carlsbad Caverns National Park, and Chaco Culture National Historic Park. Note that there are no current oil and gas operations at Carlsbad Caverns National Park or Chaco Culture National Historic Park. Any future operations would undergo site specific environmental compliance, as well as tribal consultation, prior to any permit being issued.

We will consult with you again when the DEIS and Proposed Rule are released. For more information on the rulemaking effort, please see http://www.nature.nps.gov/geology/oil_and_gas/9b_index.cfm. If you wish to consult with the NPS regarding this project, please write to the address above or contact Michael B. Edwards of the NPS's Environmental Quality Division at (303) 969-2694, michael_b_edwards@nps.gov, or Edward O. Kassman, Jr., of the NPS's Geologic Resources Division at (303) 969-2146, edward_kassman@nps.gov. Thank you for your consideration.

Sincerely,

A handwritten signature in black ink that reads "David L. Steensen". The signature is written in a cursive style with a long horizontal stroke at the end.

David L. Steensen, Chief
Geologic Resources Division

1/2/14 DEPARTMENT OF THE INTERIOR Mail - NPS, draft Programmatic EIS on revisions to nonfederal oil and gas rights regulations, multiple counties, multipl...



NPS, draft Programmatic EIS on revisions to nonfederal oil and gas rights regulations, multiple counties, multiple states

Johnnie L. Jacobs <jjacobs@choctawnation.com>
To: "michael_b_edwards@nps.gov" <michael_b_edwards@nps.gov>

Fri, Dec 27, 2013 at 4:23 AM

Dear Michael,

Thank you for the correspondence regarding the DEIS that will be released for public comment in 2014. The Choctaw Nation of Oklahoma would like the opportunity to review the DEIS at the earliest opportunity, and if possible, before the release to the general public. Thank you again for the early notification, we look forward to working with NPS on this review. If you have any further questions, please let us know.

Thank you,

Ms. Johnnie Jacobs
NHPA Section 106 Coordinator
Choctaw Nation of Oklahoma
Historic Preservation Department
P.O. Box 1210
Durant, OK 74701
jjacobs@choctawnation.com

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IN REPLY REFER TO:

United States Department of the Interior

NATIONAL PARK SERVICE
Geologic Resources Division
P.O. Box 25287
Denver, Colorado 80225

April 29, 2014

Choctaw Nation of Oklahoma
NHPA Section 106 Coordinator
ATTN: Johnnie Jacobs
P.O. Box 1210
Durant, OK 74701

Dear Ms. Jacobs:

Thank you for your response to the National Park Service's (NPS) initial tribal consultation letter regarding the Draft Programmatic Environmental Impact Statement (DEIS) on revisions to nonfederal oil and gas rights regulations Title 36, Code of Federal Regulations, Part 9, Subpart B ("9B regulations") and Proposed Rule.

Your response requested an opportunity to review the DEIS at the earliest possible opportunity, and if possible, before the release to the general public. The NPS will respond to your request as soon as we have a document ready for printing and permission to release the DEIS, but as you indicated, preferably prior to its actual release to the general public.

For more information on the rulemaking effort, please see http://www.nature.nps.gov/geology/oil_and_gas/9b_index.cfm. If you wish to consult with the NPS regarding this project, please write to the address above or contact Michael B. Edwards of the NPS's Environmental Quality Division at (303) 969-2694, michael_b_edwards@nps.gov, or Edward O. Kassman, Jr., of the NPS's Geologic Resources Division at (303) 969-2146, edward_kassman@nps.gov. Thank you for your consideration.

Sincerely,

David L. Steensen, Chief
Geologic Resources Division



LeRoy N. Shingoitewa
CHAIRMAN

Herman G. Honanie
VICE-CHAIRMAN

December 2, 2013

David L. Steensen, Chief
Attention Michael B. Edwards, Edward O. Kassman, Jr.
National Park Service, Geologic Resources Division
P.O. Box 25287
Denver, Colorado 80225

Dear Mr. Steensen,

This letter is in response to your correspondence dated November 14, 2013, regarding the National Park Service (NPS) preparing a draft Programmatic Environmental Impact Statement on revisions to nonfederal oil and gas rights regulations. The Hopi Tribe claims cultural affiliation to the prehistoric cultural groups in the Southwest. The Hopi Cultural Preservation Office supports the identification and avoidance of prehistoric archaeological sites, and we consider the prehistoric archaeological sites of our ancestors to be Traditional Cultural Properties. Therefore, we appreciate the NPS's continuing solicitation of our input and your efforts to address our concerns.

Your correspondence states that the NPS has identified the Hopi Tribe as "one affiliated with one or more of the following parks units..." We continually point out to the NPS that pursuant to the Native American Graves Protection and Repatriation Act (NAGPRA), "cultural affiliation" is defined as a shared group identity between an earlier identifiable group and a modern day tribe, and is not between a modern day tribe and a NPS place. Please use the term "traditionally associated" when referring to the relationship between modern day tribes and NPS places.

The Hopi Tribe claims cultural affiliation to the prehistoric cultural groups at Aztec Ruins in Category 1, parks that have current oil and gas operations, and Dinosaur, Great Sand Dunes, Mesa Verde, Chaco and Glen Canyon in Category 2, parks that have potential for future operations. The Hopi Cultural Preservation Office understands the Environmental Impact Statement will analyze a range of alternatives to revising existing regulations and the potential environmental impacts on park resources.

Therefore, we desire to consult with the NPS on the proposed project and look forward to receiving a copy of the Draft Environmental Impact Statement and Proposed Rule for review and comment. If you have any questions or need additional information, please contact Terry Morgart at tmorgart@hopi.nsn.us or 928-734-3619. Thank you for your consideration.

Respectfully,

A handwritten signature in black ink, appearing to read "Leigh J. Kuwanwisiwma".

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

xc: Superintendents: Aztec, Chaco, Dinosaur, Glen Canyon, Great Sand Dunes, Mesa Verde
New Mexico and Colorado State Historic Preservation Offices

Appendices



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

(2015)

United States Department of the Interior · National Park Service